THE SOUTHERN PLANTER

Devoted to Agriculture, Horticulture, and the Household Arts.

Agriculture is the nursing mother of the Arts. [XENOPHON.

Tillage and Pasturage are the two breasts of the State.—SULLY.

J. E. WILLIAMS, EDITOR. AUGUST & WILLIAMS, PROP'RS.

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From Josiah Parkes' Essays on the Philosophy and Art of Land-Drainage.

[CONTINUED FROM MARCH NO. SOUTHERN PLANTER.]

SECTION V.

On the Quantity of Rain Compared with the Quantity of Water Evaporated from or filtered through Soil; with some Observations on the Quantity of Rain-Water discharged by Drains.

We are indebted to Mr. John Dickinson, of Abbott's Hill, near King's Langley, Herts, (the eminent paper manufacturer,) for a register, extending over a period of the last eight years, of the quantity of rain which has fallen in his locality, and of the quantity which may be presumed to have passed through the soil. The first datum is determined by the common rain-gauge; the second is derived from a gauge invented many years since for this special purpose, by the illustrious Dalton. And hereby we obtain, very unexpectedly, as regards both the facts and the extensive range of observations, experimental illustrations of the desiderata numbered 5 and 6 [in the preceding section.] The construction of the rain-gauge needs no remark, and the Dalton gauge is equally simple. It consists of an open-top cylinder or rain-receiver sunk vertically in the earth, level with its surface, having a false bottom perforated with holes like a cullender, which supports three feet depth of soil within the cylinder, through which, and through the cullender, the excess of the rain—or the portion not evaporated—filtrates to the close bottom of the vessel; and this communicates, by means of a small pipe, with a vertical tube, whose diameter bears some definite proportion to that of the receiver, and is sunk so much lower in the earth as to have its top nearly on a level with the bottom of the receiver. Thus, all the water which permeates the soil contained within the rain-receiver flows into the tube, and is measured by a float, carrying a divided stem, and indicating, in parts of 1-100th of an inch the quantity of rain which has entered it. The measuring tube has a cock at the bottom for evacuating its contents from time to time and bringing the scale to zero.

Mr. Dickinson's rain-receiver has a diameter of twelve inches, and is thirty-six inches deep to the false bottom; it was originally filled with the soil of the country, a sandy, gravelly loam, and has constantly had grass growing on it. The contents of the receiver, therefore, represent fairly the natural state of the soil; whilst the gauge indicates the quantity of water which a drain, at the

depth of three feet, would have to convey away. The proportion which this quantity bears to the rain is obtained by comparison with the rain-gauge; and their difference gives the quantity evaporated, assisted by the action of the succulent grasses. We may, however, for the present purpose, consider the whole of this last quantity under the term evaporation.

It will be interesting and useful to agriculturists to learn Mr. Dickinson's object, as a manufacturer, in ascertaining and registering phenomena of this nature. Having several mills on the river Colne or its tributaries, it was a matter of importance to him to be able to calculate the power of the water on which he might depend for use at different periods of the year; and, having noticed that a considerable period elapsed after rain, owing to the extent and stratification of the country, before the springs were affected by it, he fixed a rain and Dalton gauge to assist his judgment in forming an estimate of the amount and duration of their flow according to the varying seasons, and the proportionable water-power on which he might count. These registers, combined with observation, have since enabled him to regulate his manufacturing operations, and to foresee what dependence he could place on the mill-streams, and to what extent he should require the aid of steam-power for fulfiling his contracts and engagements. This is a very remarkable and honorable instance of the application of meteorological "science to practice."

Nor is this all—for the knowledge acquired by means of these instruments and the exposition of the results of rain and filtration proved by them, together with a just acquaintance with the area and nature of the soils in the district, supplying the streams (about 120 square miles) enabled Mr. Dickinson, * * * to demonstrate the impracticability of a scheme for furnishing the metropolis with water proposed to be drawn from the valley of the Colne, which must have inflicted irreparable injury on the mill-owners, at the same time that it would have proved, in all probability, an abortive speculation to the adventurers. Such are the various and often unexpected fruits of exact knowledge. It was Mr. Dickinson's communication, of his experiments to the Institution of Civil Engineers last year, which introduced me to his acquaintance, and has enabled me to apply his acquired facts to the subject of agricultural drainage.

The annexed table, No. I., contains the monthly and annual indications of the two gauges for the years 1836 to 1843 inclusive; those of the rain-gauge being, Mr. Dickinson informs me, generally corroborated by another gauge kept by the Grand Junction Canal Company, about eight miles distant.

Table II. gives the mean result of eight years observations for each month, and the whole period, in terms of the depth of rain which fell on the surface—of the amount which filtered through the Dalton gauge—and of that which was evaporated or again restored to the atmosphere in the shape of vapour—with two columns showing the proportion per cent. of filtration and evaporation.

Table III. presents to view the total amount of rain which fell during each year, with the per centage of filtration and evaporation; and

Table IV. illustrates the quantity of rain, and the proportion of water disposed of by filtration and evaporation during the six hotter and the six colder months of each year respectively. To these last tables I have added columns exhibiting the weight of rain in tons per acre, as that expression may convey to the farmer a clearer idea of its amount, than the more usual mode of stating it in inches of depth. By means of this tabular analysis we shall find the phenomena, as they may be applicable to agriculture, early brought before us.

The first important fact disclosed is, that, of the whole annual rain about 42½ per cent., or 11 3-10th inches out of 26 6-10th inches have filtered through the soil; and that the annual evaporation force is only equal to the removal of about 57½ per cent. of the total rain which falls on any given extent of earth three feet in depth. (Table II.)

By a closer scrutiny we learn (table IV.) that only about 25½ per cent. of the rain which falls from October to March inclusive, passes back to the atmosphere by evaporation in the same period; whereas, from April to September inclusive, about 93 per cent. is evaporated. It appears then that there is even a balance on the side of rain over evaporation during the six hottest months; and we discover only two years, 1840 and 1841, in which no filtration occurred within that period. Table II. shows

that in August the soil is in its driest state; but, even in that month, some filtration took place in three out of the eight seasons recorded. It will be understood, that, though a near balance is shown to subsist between rain and evaporation during the six hottest months, on an average of years, the hygrometric condition of a soil, *i. e.*, its state of wetness or dryness at any particular time, is not indicated by the Dalton gauge. A soil may be in a state of drought or of humid saturation, at different times during these months, and according to the season. It is, however, manifest, from these registers, that if all the water derived from rain during the six colder months were allowed to accumulate in a soil, such land must be perpetually *wet;* and coupling this fact with the performance of drains, which I am now enabled to exhibit, it appears that six months are expended in maintaining, by the sole unaided force of evaporation, an undrained, retentive soil in a tolerably uniform moist condition, whilst deep covered drains relieve the same soils of excess of humidity in a very few hours after every fall of rain even in the wettest season.

TABLE I.

MONTHS.	1836. Gauges. Rain.	1836. Gauges. Dalton.	1837. Gauges. Rain.	1837. Gauges. Dalton.	1838. Gauges. Rain.	1838. Gauges. Dalton.	1839. Gauges. Rain.	1839. Gauges. Dalton.	1840. Gauges. Rain.	1840. Gauges. Dalton.	1841. Gauges. Rain.	1841. Gauges. Dalton.	1842. Gauges. Rain.	1842. Gauges. Dalton.	1843. Gauges. Rain.	1843. Gauges. Dalton.
	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's	Inch's
January,	2.40	2.32	2.40	2.10	0.31	0.04	1.40	1.04	3.95	3.05	1.50	..	1.36	1.60	1.46	1.25
February,	2.04	2.04	2.85	2.92	2.65	0.86	1.45	1.51	1.32	1.00	1.02	..	2.02	2.10	2.42	1.95
March,	3.65	2.51	0.75	0.01	1.55	2.73	1.92	1.22	0.34	..	1.65	0.53	2.20	1.62	0.88	..
April,	2.57	1.74	1.32	..	1.35	..	1.65	0.71	0.34	..	1.85	..	0.47	..	2.10	..
May,	0.70	0.03	0.94	..	0.84	..	1.22	0.10	2.62	..	1.68	..	1.85	..	5.00	0.74
June,	1.80	0.01	1.86	..	2.85	..	3.31	0.05	1.33	..	3.00	..	2 0	..	1.56	0.25
July,	2.29	0.10	1.30	..	2.35	0.09	4.36	0.15	1.18	..	2.80	..	1.93	..	2.09	..
August,	2.24	0.15	3.10	0.05	0.95	..	3.65	0.09	1.90	..	3.62	..	1.40	..	2.66	..
September,	2.60	0.07	1.38	0.05	2.47	0.03	3.22	1.50	2.31	..	4.00	..	4.50	1.30	0.63	..
October,	4.55	3.82	1.5[illegible]	0.02	2.68	0.07	1.68	0.09	1.50	..	4.40	5.99	1.41	0.30	4.82	0.91
November,	3.95	3.14	2.05	0.18	3.55	2.91	4.40	4.70	4.25	2.57	4.28	4.87	5.77	5.00	2.45	2.70
December,	2.21	1.72	1.70	1.62	1.58	1.84	3.02	3.75	0.40	1.57	2.30	2.80	1.52	0.84	0.40	0.30
Total,	31.[illegible]	17.65	21.10	6.95	23.13	8.57	31.28	14.91	21.44	8.19	32.10	14.19	26.43	11.76	26.47	8.10

TABLE II.

MONTHS.	Mean of each Month and of eight Years.				
	Rain.	Filtration.	Evaporation.	Filtration.	Evaporation.
	Inches.	Inches.	Inches.	Per Cent.	Per Cent.
January, - -	1.847	1.307	0.540	70.7	29.3
February, - -	1.971	1.547	0.424	78.4	21.6
March, - - -	1.617	1.077	0.540	66.6	33.4
April, - - -	1.456	0.306	1.150	21.0	79.0
May, - - -	1.856	0.108	1.748	5.8	94.2
June, - - -	2.213	0.039	2.174	1.7	98.3
July, - - -	2.287	0.042	2.245	1.8	98.2
August, - - -	2.427	0.036	2.391	1.4	98.6
September, -	2.639	0.369	2.270	13.9	86.1
October, - -	2.823	1.400	1.423	49.5	50.5
November, - -	3.837	3.258	0.579	84·9	15.1
December, -	1.641	1.805	0.164	100.0	00.0
Total, - - -	26.614	11.294	15.320	42.4	57.6

TABLE III.

YEARS.	Total of each Year.			
	Rain.	Filtration.	Evaporation.	Rain per Acre.
	Inches.	Per Cent.	Per Cent.	Tons.
1836,	31.0	56.9	43.1	3139
1837,	21.10	32.9	67.1	2137
1838,	23.13	37.0	63.0	2342
1839,	31.28	47.6	52.4	3168
1840,	21.44	38.2	61.8	2171
1841,	32.10	44.2	55.8	3251
1842,	26.43	44.4	55.6	2676
1843,	26.47	36.0	64.0	2680
Mean,	26.61	42.4	56.7	2695

TABLE IV.

April to September inclusive.

Years.	Rain.	Filtration.	Evaporation.	Filtration.	Evaporation.	Rain per Acre Filtrated.	Rain per Acre Evaporated.
	Inches.	Inches.	Inches.	Per Cent.	Per Cent.	Tons.	Tons.
1836,	12.20	2.10	10.10	17.3	82.7	212	1023
1837,	9.80	0.10	9 70	1.0	99.0	10	982
1838,	10.81	0.12	10.69	1.2	98.8	12	1082
1839,	17.41	2.60	14.81	15.0	85.0	263	1500
1840,	9.68	0.0	9.68	0.0	100.0	..	980
1841,	15.26	0.0	15.26	0.0	100.0	..	1545
1842,	12.15	1.30	10.85	10.7	89.3	131	1099
1843,	14.04	0.99	13.05	7.1	92.9	100	1322
Mean,	12.67	0.90	11.77	7.1	92.9	91	1292

October to March inclusive.

1836,	18.80	15.55	3.25	82.7	17.3	1574	330
1837,	11.30	6.85	4.45	60.6	39.4	693	452
1838,	12.32	8.45	3.85	68.8	31.2	855	393
1839,	13.87	12.31	1.56	88.2	11.8	1246	159
1840,	11.76	8.19	3.57	69.6	30.4	829	362
1841,	16.84	14.19	2.65	84.2	15.8	1437	269
1842,	14.28	10.46	3.82	73.2	26.8	1059	387
1843,	12.43	7.11	5.32	57.2	42.8	720	538
Mean,	13.95	10.39	3.56	74.5	25.5	1052	360

Note.—The quantities of rain in the columns headed Filtration, represent the required performance of drains in retentive soils. One-tenth of an inch of rain in depth amounts to 10.126 tons per acre.

Table IV. shows that the mean excess of rain-water to be disposed of during the six coldest months by some other process than evaporation, amounts to no less a weight than about 1,050 tons per acre.

Evaporation is the only *natural* agent for diminishing the quantity of water absorbed by retentive soils, but it is not at our command. When such soils are perfectly saturated, the superfluity must either stagnate upon the surface or flow away from it; and proof is here offered, that the force of evaporation is scarcely equivalent to the duty required of it during one half of the year; also that it greatly falls short of the requisite power during the six colder months. This invention of subterranean drains supplies an effective artificial method of compensating the deficiency of the evaporative force in our climate, and it is capable of placing the retentive soil in the same favorable condition as respects meteorological agency and the fruition of every agricultural process, as soils naturally porous, and free from stagnant water. But, it must constantly be borne in mind, that, in order to assimilate this artificial process, to that of nature, drains should be *deeply laid*, as the floor of the drains forms the limit of their action, and determines the depth below the surface at which water must still remain in a state of nearly constant excess and stagnancy.

A study of the results registered in these Tables, puts us in possession of many other facts of import to the agriculturist, as enforcing the warning—which experience cannot have taught him—to adopt every appliance at his command for placing his soil in such condition as to derive the greatest benefit and the least evil from elemental influences; for, so variable are the seasons, that no average can properly display the changing amounts of meteorological quantities and forces. It seems from Table I., that the discharge of water by drains occurs, on the average, during seven months of the year. In 1840 and 1841, however, rain was in excess over evaporation only during four months; though in the first year 21 4-10 inches of rain fell, whilst in the second the earth received 32 1-10 inches, or 50 per cent more rain in the latter than in the former year; yet, the soil was equally dry in both years on the mean of the six hottest months, for the evaporative force was able to relieve the soil of all the rain that fell, though the quantities were so widely different, being 15 2-10 inches in 1841, and only 9 6-10 inches in 1840. But, turning to the colder months of the same years, we find the case reversed, for the proportionate evaporation in 1840 was double that in 1841. It appears, too, that in 1836, when the quantity of rain was only about one inch less than the maximum in 1841, the force of evaporation was 13 per cent. less, and water filtered through the gauge in various proportions during every month of that year, and the same in 1839. Thus in preparing soil to receive the utmost benefit and the least evil from rain, however slight or excessive, it should be put into a state to refuse holding water in excess, but be capable of absorbing humidity freely, and retaining it deeply; whilst the drains should admit water with facility, and convey it away with dispatch.

Observations on the quantity of Rain-water discharged by Drains.

The quantities of rain and filtration denoted by Mr. Dickinson's gauges are daily registered, and this record has enabled me to ascertain a remarkable coincidence between the action of the Dalton gauge and that of Mr. Hammond's inch-pipe drains, as reported by me to the Royal Agricultural Society, in Journal, Vol. IV., p. 375. It appears, according to the rain gauge, that 48-100ths of an inch of rain fell on the 7th and 8th of November last; and by the Dalton gauge, on the 9th, 46-100ths, or nearly the whole of this quantity, had passed through it. It was on the 9th that I inspected the drainage of Mr. Hammond's farm, recording the fact that, after a rain of about 12 hours' duration on the 7th, I found the drains on the 9th in a nine-acre piece, 3 feet deep, just dribbling, and those in a hop-ground adjoining, 4 feet deep, exhausted; Mr. Hammond having observed, previously to my arrival, that the greatest stream at the outfall of each drain, amounted to about the half-bore of the inch-pipes. The times occupied in the discharge of the water by the gauge and the drains may, therefore, be considered to be identical, and as comprising about 48 hours from the commencement of the rain. In drawing this parallel between the action of the gauge and these drains, I am presuming that the fall of rain at Penshurst was equal to that at King's Langley; and I think this may

be assumed to be near enough to the truth, as I have learnt that a nearly similar downfall (5-10ths of an inch) was recorded at Burmingham northwards, and a rain of similar duration occurred at Brighton southwards.

This experimental corroboration of the sufficiency of such small drains, will have its weight with practical men; but I am further able to demonstrate, by simple arithmetical computation, how very small is the quantity of water required to enter the crevice formed by the imperfect junction of two pipes. The rain-gauge informs us, that 48-100ths of an inch in depth of rain fell upon each square foot of surface in the observed time of 12 hours. The quantity is equivalent to 69 1-10th cubic inches, or 2½ pounds, which, divided by 12 hours, gives little more than 2-10ths of a pound per square foot of surface per hour for the weight of the rain.

The drains were 24 feet asunder, and each pipe a foot in length, so that each lineal foot had to receive the water falling on 24 square feet of surface, equal to 60 pounds, or 6 gallons; and as the time which this quantity occupied in descending through the soil and disappearing was about 48 hours, it results, that 1¼ pounds, or one pint, per hour, entered the drain through the crevice existing between each pair of pipes. Every one knows without having recourse to strict experiment, how very small a hole will let a pint of water pass through it in an hour, being one-third of an ounce per minute, or about twice the contents of a ladies thimble.

The weight of rain, per acre, which fell during the 12 hours, amounted to 108.900 pounds, or 48 6-10 tons, which on the whole piece of nine acres, is equal to 437 4-10 tons; and each drain discharged 19 tons, equal to about 4-10ths of a ton per hour, on the mean of 48 hours; but when the flow was at the greatest, I find that each drain must have discharged at the rate of five times this quantity per hour, which affords proof of the faculty of the pipes to receive and carry off a fall of rain equal to 2½ inches in 12 hours, instead of half an inch, a fall which is quite unknown in this climate. Half an inch of rain in 12 hours is a very heavy rain. I learn from Mr. Dickinson that his rain-gauge has never indicated so great a fall as 1½ inches in 24 hours; and from Dr. Ick, the Curator of the Burmingham Philosophical Institution, that only on five occasions has the rain there exceeded 1 inch in 24 hours, during the same period of 8 years, the greatest quantity having been 1 6-10ths of an inch on December 4th, 1841. We may, therefore, consider the fact of the sufficiency of inch-bore pipes for agricultural drainage to be fully demonstrated both by experience and experiment.

I will now mention an experiment which every farmer is competent to make, and which can not fail to throw light on the action and effect of his drains, and on the relative condition of different pieces of land as to porosity, or filtrating activity—I allude to the simple ascertainment by measure, of the quantity of water discharged from different drains, after rain, in the same time. In reply to numerous inquiries on this subject, I have only succeeded in obtaining sufficiently exact information from Mr. Hammond, whose intelligence had led him to make the experiment without any suggestion from me. He states: "I found after the late rains, (Feb. 17th, 1844,) that a drain, 4 feet deep, ran 8 pints of water in the same time that another, 3 feet deep, ran 5 pints, although placed at equal distances." The circumstances under which this experiment was made, as well as its indications, deserve particular notice. The site was the hop ground before referred to, which had been underdrained 35 years since to the depth varying from 24 to 30 inches; and though the drains were laid somewhat irregularly and imperfectly, they had been maintained in good action. Mr. Hammond, however, suspecting injury to be still done to the plants and the soil by *bottom* water, which he knew to stagnate below the old drains, again underdrained the piece in 1842 with inch pipes, in part, to 3 feet, and in part, to 4 feet in depth, the effect proving very beneficial. The old drains were left undisturbed, but thenceforth ceased running, the whole of the water passing below them to the new drains, as was to be expected The distance between the new drains is 26 feet, their length 150 yards, the fall identical, the soil clay. The experiment was made on two drains adjoining each other, *i. e.*, on the last of the series of the 3 feet, and the first of the series of the 4 feet drains. The sum of the flow from these two drains, at the time of the trial, was 975 pounds per hour, or at the rate of 19½ tons per acre in 24 hours—the proportionate discharge, therefore, was 12 tons by the 4 feet, and 7½ tons by the 3 feet drain.

No springs affected the results. Hence, we have two phenomena very satisfactorily disclosed: 1st, that the deepest drain received the most water; 2nd, that it discharged the greatest quantity of water in a given time—the superficial area of supply, being the same to both drains. It would appear, then, either that the deeper drain had the power of drawing water from a horizontal distance greater by the ratio of 8 to 5 than the shallower drain; or that the perpendicular descent of the water was more rapid into the 4 feet drain; or that its increased discharge was owing to both these causes combined. The phenomenon of a deep drain drawing water out of soil, from a greater distance than a shallower one, is consistent with the laws of hydraulics, and is corroborated by numberless observations on the action of wells, &c.; but the cause of the deeper drain receiving more water *in a given time* is not so obvious. An opposite result, as to time, would rather be expected from the fact of water falling on the surface, having to permeate a greater mass of earth, both perpendicularly and horizontally, in order to reach the deep drain. A natural agricultural bed of porous soil resembles an artificial filter, and it is unquestionable that, the greater the depth of matter composing such filter, the slower is the passage of water through it. In stiff loams and clays, however, but more particularly as regards the latter earth, the resemblance ceases, as these soils can permit free ingress and egress of rain-water, only after the establishment of that thorough net-work of cracks or fissures which is occasioned in them by the shrinkage of the mass from the joint action of drains and superficial evaporation. These fissures seem to stand in the stead of porosity in such soils, and serve to conduct water to drains rapidly, after it has trickled through the worked bed; it is possible, too, that in deeply drained clays of certain texture, the fissures may be wider, or more numerous in consequence of the contraction of a greater bulk of earth, than when such soil is drained to a less depth. However this may be, it is ascertained by several respectable and intelligent farmers in Kent, who have laid drains very deeply in clays and stiff soils, that the flow from the deepest drains invariably commences and ceases sooner than from shallower drains, after rain. On this interesting and unexplored subject I hope to be able to furnish multiplied observations after next winter, and trust also to receive the co-operation of the members of the Society in making them in different soils, and with due regard to all those phenomena which may influence the results, or be detected by them.

The consideration of the depth of drains has been too generally limited to the mere exigencies of culture and implements, combined with the natural desire to restrict expense when the materials used were dear, and the cost of earth-work great. These adventitious circumstances have certainly tended to obscure from view the true principles on which drainage should be founded, and on which the utmost benefits to be derived from it depend. The question of distance between drains is important on the score of expense, and it will be wise to err on the right side, and keep within safe limits; but insufficiency of depth can only be remedied by a new outlay. So far as experience can illuminate the subject, we know that many agriculturists have, a second time, drained their fields to a greater depth; it may, however, be doubted whether any one has taken up deep drains, and placed them nearer the surface, or nearer together. The system of deep drainage has, doubtless, been encouraged by the cheapness, lightness and approved action of the pipe-tiles, combined with the more moderate cost of the earth-work incident to their small dimensions, and to the facility of laying them. The aggregate cheapness of the work has set the mind of the farmer free to contemplate more exclusively and attentively the perfection of the end in view; and it is well worthy of remark, that experiment and experience have rapidly induced the adoption of a system of parallel drains consederably deeper, and less frequent, than those commonly advocated by professed drainers, or in general use. I gave several instances of this practice in Kent, in the report of last year, already alluded to, and it is rapidly extending. Mr. Hammond stated (*Journal*, Vol. IV., p. 47), that he drained "stiff clays 2 feet deep, and 24 feet between the drains, at £3. 4. 3. per acre," and "porous soils 3 feet deep, 33½ feet asunder, at £2. 5. 2. per acre." I now find him continuing his drainage at 4 feet deep, wherever he can obtain the outfall, from a conviction, founded on the experience of a cautious progressive practice as to the depth and distance, that depth consists with economy of outlay as well as with superior effect. He has found 4 feet drains to be efficient, at 50 feet asun-

der, in soils of varied texture—not uniform clays—and executes them at a cost of about £2. 5. 0. per acre, being 18s. 4d. for 871 pipes, and £1. 6. 6. for 53 rods of digging. Communications have been recently made to me, by several respectable Kentish farmers, of the satisfactory performance of drains deeply laid in the Weald clays, at distances ranging from 30 to 40 feet, but I have not had the opportunity of personally inspecting these drainages.*

The following little table shows the actual and the respective cost of the above three cases of under-draining, calculated on the effects really produced, *i. e.*, on the masses of earth effectively relieved of their superfluous water at an equal expense. I conceive this to be the true expression of the work done, as a mere statement of the cost of drainage per acre of surface conveys but an imperfect, indeed, a very erroneous idea of the substantive and useful expenditure on any particular system. This will be apparent on refereuce to the two last columns of the table, which give the cost in cubic yards and square yards of soil drained for one penny at the above mentioned prices, depths and distances.

Depth of the Drains in feet.	Distance between the Drains in feet.	Mass of Soil Drained per acre, in cubic yards.	Mass of Soil Drained for 1d. in cubic yards.	Surface of Soil Drained for 1d. in square yards.
2	24	3226½	4.1	6.27
3	33½	4840	8.93	8.93
4	50	6453	12.00	8.96

I may here observe, that Mr. Hammond, when draining tenacious clays, chooses the month of February for the work, when he lays his pipes, (just covering them with clay to prevent crumbs from getting in,) and leaves the trenches open through March, if it be drying weather, by which means he finds the cracking of the soil much accelerated, and the complete action of the drains advanced a full season. The process of cracking may, doubtless, be hastened both by a choice of the period of the year in which the drains are made, and by such a management of the surface as to expose it to the full force af atmospheric evaporation.

Recurring to the foregoing tables, it must be noticed that the mean annual fall of rain, as therein registered, is below the average of Britain, whilst the force of evaporation is probably higher than the average; and the monthly as well as annual amounts of filtration and evaporation may be expected, in different latitudes, localities and soils, to vary greatly from these records. Similar observations obtained on different soils, and in various parts of the country, when combined with the indications of thermometers sunk in the earth, would put us in possession of that condition of soil, which may not be improperly termed *climate*, of which no certain knowledge can be deduced from purely meteorological phenomena, but upon which the atmospheric climate of a district is known greatly to depend.

Meteorologists have recorded, for many years, the amount of terrestrial evaporation, as denoted by a gauge invented by Mr. Luke Howard, and have considered it as indicative of the quantity of moisture taken up by the atmosphere from the earth;" but, this instrument only denotes the evaporation from a dish of water placed on the earth's surface, and therefore supplies no fact of direct use to the agriculturist, for cultivated soils are not under these circumstances, and the power of the sun's rays in heating soils is but indifferently represented by their effect in transforming water into vapour. The difference between the indications of the Howard and Dalton gauges is most remarkable. Professor Daniell states (*British Almanac*) the mean annual rain in London to be 22.199 inches, and the mean evaporation 23.981 inches, or 1.782 inches more than the rain; and the results recorded by the Burmingham Philosophical Institution for 1843 are, rain 26.716 inches, evaporation 31.982 inches, or 5.266 inches more than the rain. But we learn from the Dalton gauge that, in Hertfordshire, out of 26.614 inches of rain on 15.32 inches were restored to the atmosphere—the remainder passed through the earth into the rivers; and this is the real fact on comparing the amount of rain with the amount evaporated from soil 3 feet deep.

We must never forget that accurate and multiplied quantitative facts form the only substantial basis of science; and observa-

* The cost above given can only be taken as that of the particular case. The cost of drainage (See page 63) is affected by the texture of soils, their stoniness, &c.; and rates of work are being paid, varying from 3d. to even 1s. 6d. per rod (5½ yards), causing the cost of drainage per acre to vary from £2. to even £5. per acre, according to circumstances.

tions of the rain and Dalton gauges would be usefully varied by placing the latter at different depths, as at 1, 2, 3 and 4 feet, or more, below the surface, and filled with a diversity of soils, whence information may be expected to arise of great practical value to the agriculturist.

[*To be concluded in our next number, with the author's Lecture on Draining.*]

For the Southern Planter.

What has become of our Birds?

MR. EDITOR:

The aged and infirm, in general, should not wait to be advised by others to withdraw from much intercourse with the public. The aged, however, ought to be best qualified to answer the question, forming our caption. They have lived during the time that much of the diminution in the number of birds—so much complained of in our agricultural journals of late—has been occurring, and if they have been in the habit of noticing things around them, must be able to tell something of the rapid decrease in the number of birds, as also of the consequent increase in the number of insects.

A scarcity of birds is a misfortune to any country and, agriculturally, it is a calamity. This hardly needs illustration, for it is manifest to all who will recollect what destructive depredations have been committed, even in the experience of our young farmers, on our sprouting and young corn, by clover-worms,* wire-worms, cut-worms and a variety of other vermin of this description—on our wheat, by chinch-bugs, Hessian-fly, joint-worms, etc. These are the most common depredating insects; space is not allowed to specify all which I could enumerate. Let him who doubts whether birds eat insects to any useful extent, confine his turkeys, or his Guinea fowls—which are said to be better—for one season on a tobacco-lot, and he will have to account for the absence of horn-worms. But, I believe, the fact is admitted by all.

The scarcity of our birds, or rather the decrease of our former supply, is ascribable to several causes, some of which are hardly removable; but I would fain hope, they are all by a judicious and united public sentiment and effort, capable of mitigation. In enumerating these causes, I would set down as most efficient—

I. Peculiarities in our climate, which have doubtless increased since the settlement of the country and clearing away the forests. These consist in very sudden and violent changes of weather, dependent mainly on the direction whence the wind blows, both in winter and summer, and affect different classes of birds as the season in which they prevail may be present. The varieties of our feathered tribes may be divided into several classes. There are such as may be called the indigenous or aboriginal birds, or those which remain with us all the year round. These are the turkey, pheasant, quail, or, as we call him, partridge; the crested or winter red-bird, the crested tit-mouse and some others. Of this class, the crow and the wild turkey may sustain life, when the ground is deeply covered with snow—and when food is obtainable, they regard not the cold—by picking the seed from the cones or burs of the pines, so abundant with us. The pheasant at such times finds nourishment perhaps from pine-seed, and doubtless from berries which grow in the ranges which alone he will consent to abide in. I suspect the berries borne by what we call the green-barked swamp-dogwood, and by the bamboo, are his favorites. But poor *Bob White!* All the grass, clover and weed-seed on which he relies for his winter store of provision being covered a foot or two deep, must go supperless to bed and starve, unless he luckily find some rare friend, such as a good man whom I once knew—my blessings on his memory!—who kept an old negro man, skilful in the art, cooping and trapping partridges all the fall and winter. The captives were imprisoned during the winter in a close room, well fed and----except a decimation taken by the wife, when she wanted birds for dinner—turned loose in the spring, to multiply and replenish the earth. Were this practice generally followed, partridges would become numerous; and I learned lately from "The Planter," that they have a taste, surely not to be admired, for eating chinch-bugs. However odd the taste, it is possessed in an equal or stronger degree, as I have learned from the best authority, by a beautiful favorite of some of

* Most of these little rascals may be defeated in their evil purposes, by soaking the seed corn one night in warm water, smearing with tar next morning, and rolling in flour of sulphur and plaster of Paris. If the soaking be neglected, the corn will not sprout in a dry spell of weather, being coated with tar.

our amateur ornithologists. I mean the common Blue Bird. Common chickens, I am told, will also eat them. Can you believe, sir, that any created thing will eat chinchbugs? I had believed, untill lately, that they were a black little curse upon us, with a mark on their foreheads or elsewhere on their persons, forbidding all creation to touch them; that nothing but natural death could hurt them; and I even feared that instead of dying, they crept out of their skins and went to work again. But when I learned that some birds would eat them, I cast aside despair, buckled on my old armor and determined to make one more blow, even though it might fall as feebly as the last cast of the lance of old king Priam.

II. Another class of birds come to us from the North, in the fall, seek food here during winter, and return northwardly to rear their families, as soon as sustenance for the purpose can be found in their native haunts. These consist chiefly of geese, ducks, skimming or Canada hawks, and very rarely, white owls, and would not require notice in an agricultural article, were it not for the amazing destruction of partridges produced by the hawks. These piratical marauders skim near the surface all day, and the prey must hide well which can elude their vigilant foraging. A law for the destruction of these daring scoundrels would, I think, at least be more dignified than our county crow-laws. I wonder our enthusiastic sportsmen have never formed associations for trapping and shooting all of them that come here. The first I saw of them was about the beginning of this century, I believe in 1807. By 1810 they became numerous. In January 1856 and also in 1857, very deep snows fell, followed by much bitter weather, nearly all our partridges perished. Since then I have seen but one Canada hawk. Cold winter weather can only affect these two classes of birds, as all others generally get out of its way. I believe that most of them could withstand the cold, were they not deprived of food by the accompanying deep snows. Small quadrupeds, such as hares, which do not hibernate, perish in the same way. I have kept in my garden and about my premises, much berry-bearing shrubbery and vines, and I do not recollect a winter during which one or more mocking birds did not abide with me. Did such birds know that the berries would afford them food for the winter? There are strange mysteries in natural history. My father, nearly sixty years ago, was in the habit of spreading his straw, as he threshed out the wheat, on the next year's tobacco ground. An excellent practice, and none who have not tried it, can believe how much tobacco is improved by having land to grow on manured the season previous to its cultivation. Invariably in twenty-four hours after the straw was spread, countless multitudes of the spotted plover visited the ground; so numerous were they, that I have on several occasions killed eight at one shoot, firing on the wing at the gang. The practice was intermitted for several years, from scarcity of provender for stock. But as soon as it was resumed, the birds returned. Now the mystery to me is, whence they came, whither they went, and how they knew that the straw was spread. I have never seen a spotted plover before, nor since, and know not in what region they could have been reared. Some two or three curlews usually came with them. These were so shy that I never knew one of them to be killed.

III. Another set of our birds consists of those which remain in the State through the year, but retire to the sea coast in very cold spells, such as blue birds, robins, killdeers (perhaps), and a few others. Some of these arrive here so speedily after the wind shifts to a warmer point, that we cannot withhold from them credit for greater weather wisdom than belongs to many of our wiseacres who set up for seers in this line. As the weather can hardly hurt these shrewd little star-gazers, we must leave them to the tender mercies of other destroyers fully as relentless, to be noticed in the sequel.

IV. The greatest variety of our birds is made up of those which spend the summer with us, and depart on the approach of winter. It is from this class that I have observed the most striking diminution. So great, indeed, has this been, that I shall hardly gain credence, from any but the aged, in what I shall state. Yet who that can remember Richmond, in the close of the last, and commencement of this century, how its atmosphere was blackened by the myraids of house-martins, and other varieties of swallows, which caroled and twittered and glided through the air, can have forgotten the countless winged-rollickers? I was told that the martins found their way, in vast numbers, into the roof of the capitol,

in which were stored thousands of muskets and other arms of the State, and that they became vexatiously pestiferous to the armorers, by defiling these articles. I sometimes go to Richmond, in summer, and miss the birds much, but think the musquitos have greatly multiplied. When I was a boy the maxim prevailed, that martins would fill all the boxes you might set up for them. When I became a man I nearly verified this, for the martins not only filled all the boxes I provided for them, but took possession of the pigeon-house. I believe there were hard upon a thousand about my premises. This was very nearly "too much of a good thing"—too much noise of the same sort. But we began to have very cool spells in spring and summer, and these birds visibly diminished in number, and I think it was early in July, 1836, a wet, cold, spell occurred and lasted for many days, during which nearly every martin died—the young in the nests, and old ones were found dead on fences, and all over the farm. Whether the cold directly killed them, or caused their starvation by destroying the insects on which they fed, or driving them into inaccessible hiding-places, is doubtful. For the last twenty years I have tried much to tempt the martins to abide with me again—but have failed greatly, as with all my efforts I have enticed but five or six to do so, whilst provision for many more has been made.

The swallows, sixty years ago, were also very numerous. They took possession of every chimney-flue under which fires were not kept, and our good mothers and grand-dames would humanely suffer with cold rather than annoy the swallows by having fires kindled under them. I often bless the mother who taught me to put a nest of unfledged young ones—which had fallen, from its weight, in a damp spell—into a little basket, tied to a pole, and put it up the chimney in reach of its parents. How far birds of the swallow tribe may employ themselves in catching insects agriculturally injurious, I know not, but, as they live so much on the wing, I should think any man who hates musquitos would regret their absence. Birds of this kind certainly resort much to sheets of water, streams, and boggy grounds, to perform their aeronautical evolutions. They usually construct their nests in places out of reach, both of the little urchins, black and white, who rob bird-nests, and also of the hawks, and we would hope that one sportsman enough to hit one of them on the wing, would find better employment. So that their wonderful diminution may fairly be charged to cold weather, or a change in our climate.

Cold weather can hardly kill snow-birds. Yet there has probably been a much greater decadence in the number of these, within the memory of man, than of any, or perhaps of all others. About the year 1796 or 7, the writer thinks, he was one of four boys, at a boarding-school, who caught, in little pit-fall traps, 180 odd snow-birds in one day. The next day the good lady of the house regaled us with a pot-pie, which, to our boyish taste, produced impressions unequalled by any feasting since. I formerly heard it said, that it was about the best sign of snow falling, when these pretty little fellows congregated thickly enough for one to kill six at a shoot. I rarely, in in these days, see more than that number at one view, however scattered. These birds are said to build in ranges, on the Alleghany mountains, affording a supply of suitable food for their young. The settlement of these, in the progress of civilization, and consequent dispersion of the birds, will account, mainly, for their diminution. Some drawback on their apparent numbers, by their scattering over wider areas of cleared lands, in their modern migrations, may be made, but not much, as they chiefly assemble about homesteads in snowy weather.

We have mentioned the weather, the Canada hawks—and we had too many land-pirates of this sort before they came—and the settlements among the Alleghanies, as causes of destruction to our birds. We come now to the knights of the bird-bag. In the first place, I must confess that I once belonged to the fraternity. But while I attempt to plead their cause, I must entreat any young brother, who is in the habit of bagging from fifty to three times fifty at a shooting, to remember that they are now said to eat chinch-bugs. My common custom was to take my gun and pointer, an hour or two before sunset, and I thought I did well if I brought in from ten to twenty birds. I was, however, not a good shot, or I might have done worse than that. I consider shooting as a fine exercise and amusement, and—when not carried to excess—it invigorates both mind and body, affords dexterity in the use of fire-arms, and keeps down the number of squirrels, hares and

other predatory vermin. As to cruelty, it does not compare with the daily butchering and wringing of necks among our brutes and poultry. I would recommend to young sportsmen, in their shooting contests, to let one common hawk count for a tenth, and a Canada hawk for a fifth of the whole number of birds killed, or to agree upon some rule by which all bird-destroyers, except themselves, should be put out of the way. They may rely upon it, that every such destroyer slain is a constantly working rival removed. In this way they may even prove to be friends to the birds—for all they destroy would amount to nothing like a moiety of those devoured by hawks, owls, foxes, minks, and other such vermin. As to a younger class of sportsmen, who, soon after getting out of leading strings, are furnished with accoutrements for the business, and roam the fields, shooting every pretty bird they see, and often themselves, I cannot be apologist for them, or their parents. One such little gentleman, some six or seven years ago, got to visiting my farm with his double-barreled gun, in mid-summer, when almost all the birds had nests. I had often boasted that I had counted twenty red-birds, at one view, in my garden, enticed there, doubtless, by the berries. This young sportsman dropped them along the river-bank with a hand so unsparring that I have seen but one red-bird on the farm, that I recollect, since. The blue tanagers—also numerous and a very pretty kind of bird—fared as badly. I had thought that such gunners did but little harm. I now retract.

There is a class of bird-killers—and not a small one—which we should not pass by unnoticed. Grown-up men, who, having suffered prejudice to take the place of close investigation, ignorantly and recklessly destroy most useful birds. The killdeer—most faithful guardian of our turnip-patches—charged with eating young turnips; the different kinds of wood-peckers—guardians of our trees—are murdered ruthlessly for making holes in ears of corn, in pursuit of worms, and for feeding their young on cherries. The sweetly-singing thrush is killed for pulling up corn, which the farmer might prevent by soaking, tarring and sulphuring his seed-corn. Ah, but the birds will still pull it up, if they do not eat it. Now, crows, etc., are industrious in gratifying appetite, but, like men, they soon become weary, when they find their work is for nothing. Another sweet songster, the catbird, is hated and killed for scolding when his persecutors go near his nest. I have, several times, dissected the gizzards of killdeers—they have no crops or craws—to show their destroyers that they contain no vegetable substance, and nothing indeed but the little bug so famous for destroying young turnips and tobacco plants. These bugs can be kept out of plant-beds by a perfect fence, three feet high, without a crack. A neat log fence, well-daubed with mud, will answer. I never could raise egg-plants until I elevated boxes, in which the seed were sown, beyond their reach. They can hop like fleas—crawl with difficulty—and if they ever fly, rarely do it, for, with close watching, I have never seen them perform the exploit. These little hopping beetles are a great nuisance in the land—and I fear are rapidly increasing. The killdeers seem to be their natural enemies, and formerly collected in vast numbers, and now in small ones—if even small ones convenient, may happen to exist—to fulfil the purpose of their mission. I seldom, now-a-days, hear the cheery ring of the killdeer's voice. Let no man henceforth, kill one, except to convince himself and others that they eat no young turnips. The sacrifice of one producing such conviction may save hundreds of his brethren. The woodpecker tribe, I look upon as very valuable. The lively, spotted little fellow, who strikingly verifies the adage about giving a dog a bad name, called sapsucker, has often been shot while picking grubs from the rind of some neglected apple-tree, which its owner should have saved by scrubbing the bark well with ley, because his unlucky name seemed to imply that he was sucking out its sap. His handsome compeer, the large, spotted woodpecker, much tinged with yellow,—called lark-woodpecker, and by the boys, yucker—is the only bird I ever saw picking out and eating the worms from the roots of peach-trees. Spare him, ye farmers, and teach your boys to spare him! But where is the red-headed woodpecker—the guardian of the olden forests. His occupation's nearly gone. Civilization has almost banished them all, as it did the snow-birds, among the Alleghanies. We have cut down much the greater part of our forest-lands. We have ceased girdling trees, in the half-rotten parts of which these birds could peck out holes for their nests. We

even search out the old and dead trees for fuel. Where are the poor birds now? Like many of us, seeking homes—from dire necessity—far away. I have known a large community of them actually to arrest the progress of destruction, from the pine-borer, in a forest where one pine-tree had been felled convenient to a field of thickly girdled trees in which they dwelt. They are nearly gone now. A solitary lingerer occasionally startles us with his merry squeal, but it excites rather sad associations. This is no longer a home for them. What is called bat-fowling, also causes great increase of insects. The number of bull-bats has very much declined in modern times. We thresh wheat so much earlier than formerly, that we can better dispense with the bats, as the summer-weavil, a favorite food with them, annoys us less. Leather-winged bats —ignored by ornithologists—should be prized by farmers. They live, I believe, entirely on insects, and in their destruction of them may substitute birds. But prejudice will not spare even these poor, ugly little flutterers. They are accused of breeding chinches. Such bugs may get into sycamore-hollows, and their other domicils. But would any man destroy his poultry because chinches infest his hen-house. This they often do. Bats live, by hundreds, under the barge-boards of my dwelling-house. I know no residence, within ten miles, where musquitos are scarcer—(and I may say chinches, too, if none will call it bragging) —although there is a curved river-boundary, of more than two miles, within half a mile of the house. Pardon this and several other digressions. The whole article is written, mainly, for the good of agriculture, at which these digressions are aimed.

The Great Creator can, by storms and tempests—or, according to His own good pleasure—exterminate all, or any of His creatures. But He has so guarded animals preyed upon, against their marauders, by the law of action and reaction—in other words, of supply and demand—that the latter work against, weaken, or starve themselves, when they approach too near an extinction of the former. A community of cats, feeding only on one of rats, commit indirect suicide on themselves, when they carry on the destruction too rapidly, and must themselves decrease to that point at which the rats and their offspring can sustain them. Well-fed cats—which are much the most valuable—might succeed in effecting their destruction. Nature shields the birds, generally, in this way, from utter extinction. Even man would, probably, relinquish their pursuit, when it ceased to pay in profit or amusement.

The question has not been settled, and probably never will be, whether—on the whole—crows do most good or harm. I will not shirk it, though I confess ignorance and doubt. It seems as if it hardly need be settled, as in our region, in despite of some very keen crow-killers in my knowledge, their numbers, though confessedly prodigiously reduced, are far greater, in proportion to size, than those of any of our other birds. There are two or three animals which, some say, never die a natural death. I think the crow has as fair a title to this distinction as either of them. He has no destroyer but man, and among men there are so few who possess the genuine crow-killing talent, that, I think, with all his cunning in eluding pursuit, and his great prolificness, the danger of his extermination is not very great.

Some people protect crows as very valuable. The late John Randolph would not suffer one of them to be shot on his farm. Indeed, he fed them liberally when his young corn could be injured by them. I tried this once, but they had not faith in me—the black rascals pulled up the corn close by the bait. Probably they prefer it soured or softened in the ground for their young. In that case, by soaking the feed in water a day or two, they might be accommodated. I suspect that even then, from a proclivity to mischief natural to them, they would continue the depredation, in conformity with the boast of the black-bird to the crow, in the old nursery song:

> "Ever since old Adam was made,
> To pull up corn has been our trade."

Some hate crows so much as to put food within their reach, impregnated with a solution of arsenic, and kill them by wholesale. The gentleman mentioned above, declared to me, that he never could bring himself to administer poison to any of God's creatures—not even to rats; that he left arsenic to the doctors, and doubted whether many of *them* used it to advantage.

There is an insolence and audacity about

the crow in the achievement of his thieveries, seeming to defy retribution and challenge assault. Could the warmest apologist for crows—on finding thirty or forty of the best melons in his patch pecked to pieces, while the saucy rogues were chuckling noisily over the feat in the neighbouring trees, beyond the reach of gunshot, however—look at the black thieves, without *wishing* them all dead? If, on the whole, they do more good than harm, it is with a very bad grace, and, like all the good done by scoundrels, with a bad motive. My rule has been, whilst I have by no means loved the crows, to let them alone, except such as took to stealing the eggs and catching the young of my domestic fowls. I have sought the lives of these most sedulously. I would also contend for my melons, savagely, if need be.

As for black-birds, they may readily be cleared out, if they be considered a nuisance, by draining swamps and extirpating willows. Even were they considered valuable, we should not retain the swamps and willows, with all their accompanying evils, for their sakes. Besides, I suspect that they eat but few insects except those peculiar to swamps, whilst at certain seasons they pillage voraciously on all the grain near.

An intimation was made that remedies would be suggested, at least for the paliation of the foregoing evils. Here the writer feels himself much in the condition of a physician, who has great confidence that he could prescribe sanative remedies, but has little hope that the patient will follow the prescription. In the present case, there are too many to be consulted—nine-tenths of whom will probably pronounce the whole business a humbug; and of the very few who may approve, hardly one will adopt and endeavour to carry out the suggestions. Such are the difficulties to be overcome.

Public evils often call down public calamities, and the links which bind the various interests of civilized life, are so entangled and complicated that a lofty wisdom is required to prevent confusion and ruin. The feeble old man, who now addresses you, feels his utter impotence to wield the subject when applied to ourselves as a nation. He has no sanative remedies here. No—he begs leave, humbly, to unite with a mighty host of patriots in imploring those who are great and good to face the tempest, and agonize to avert it. I have already witnessed some stirring—grand displays of patriotic eloquence. But the good and great must not only write and speak, but buckle on their armour and fight for the cause of their country. Perhaps the people will "reverence" them. Perhaps they may be enabled to save their country!

"But fools rush in where angels fear to tread."

The peace of angels is what we need; they are said to bring no railing accusations. Can party spirit heal us? No—this was the demon which hatched the mischief. Angelic peace must sweeten—profound wisdom and virtue give power to the medicine we take. God grant that no judgments from Heaven be necessary for our cure!

But to return to the birds. Often on viewing farms, in some of our richer counties, I have asked, what provision is made for the birds? Where so many good things abound any deficiency becomes the more striking. It is worse in poorer lands, but I choose the richer for examples, on account of the contrast. We see a handsome, sometimes, a splendid dwelling, neat and substantial out-houses, beautiful shaders in the yard, very rare though in the fields, and no superabundance of woodland. How long could a decimal of the feathered races which once inhabited the same lands, be kept here now? The indigenous wild fruits are nearly all gone. Trees, shrubs, and vines, for food and for shelter, from storm and sunshine, are gone. It is true, there is an abundance of grain about its ripening time, soon to be shut up from the birds; an abundance of clover seed for such as feed on it, when it is not under snow. There are also insects enough for the pee-wees, wrens and sparrows, which are not fastidious about selecting secluded spots for their nests. The blue-bird may, perchance, find a hole in an apple-tree, if the little negroes are not permitted to rob him. Many other birds find it no home for them, and fly away. Others would remain, and soon pay for coarse boxes, six inches square, to dwell in, if supplied with them.

Some birds affect particular haunts or localities, as was said of the pheasants. I have seen the scarlet tanagor—I know no common name for him—only in a range parallel to the Blue Ridge, and about thirty

miles, south-east from it. This is a very showy bird, brilliant scarlet in colour, with glossy black wings, bill and lower legs. The rain-crow used to be very numerous in the same range, both doubtless attracted by some food unknown to us, or by the charms of seclusion, to these barren wilds.

The mocking bird will rarely abide where there are neither red hawthorns nor large wild rose bushes. The Baltimore oriole greatly prefers the Lombardy poplar to build in.

If we desire birds, we must remember the condition of things when they were plentiful, or, as the politicians say, "recur to first principles." Our forefathers, after they began to clear away the woods, made copses, or thickets, of shrubbery and vines, and crowded them as densely as possible not far from the dwelling. True, they were not made for the birds, but being composed of plum bushes, cherry trees, winter-fox and other grape vines, they formed a fine substitute for the departing forest growth, by affording good shelter in cold and tempestuous spells, suitable privacy for their nests, and much food for their young. The progress of refinement and luxury aided possibly by a hankering after rich ground for tobacco, swept all these away. They might cheaply be restored, and if tastily laid out, might be quite ornamental. Such spots would certainly recall many of our wandering feathered friends. Birds should be treated like roaming husbands—make home pleasant to them.

Other areas, bluffs, waste spots, and yawning gullies, too great to be filled at once at a compensative outlay, might be improved in appearance, and put to some use quite cheaply by planting them thus in trees, etc.; and if well started, they would soon become rich. It may be objected that such places breed snakes. One or two pointers or terriers, trained to hunt these, will soon clear them out. Family cemeteries, instead of laying bare in the sun, might be tastefully surrounded by groves, and the music of the birds would sweeten, while it increased the sacred solemnity.

Silk and wine culture would doubtless greatly favour the increase of our birds. The first, however, has, most probably, received its death blow twenty years ago, from the Morus Multicaulis mania—whether under the guidance of cautious and watchful experiment it might not succeed, and whether its success be desirable, I am not prepared to decide. There can be no doubt about the success of the latter, should its prosecution be directed by cautious and enlightened enterprize. Grapes are rarely killed in middle Virginia, by frosts, as they do not bloom until about the middle of May. Their health and productiveness are greatly improved by using phosphate of lime as manure.

By the foregoing appliances and other expedients to be suggested, I doubt not at all but that the number of our birds may be greatly increased. The adoption, by a large number, of the plan of imprisoning and feeding partridges in very hard weather, would greatly protect one of the most valuable species of birds which abide here during winter. By a formation of the thickets and groves recommended, and a judicious adaptation of the growth to the soil, and of its fruits to the wants of the birds, a mighty enlargement might be added to our summer birds.

The awful devastating snows which have swept away our hares and partridges, have only occurred three times in much over half a century. One in January, 1799, which did not all melt away until the last of April. Two others, in 1856 and 1857, are remembered by young people. But the hawks, except the *cute* northern ones which go away when the birds get scarce, are always here. And I wish to say a little more about hawks, as they produce a sad draw-back on the number of our other birds. Allowing one hawk for every square mile, and I am sure that is much below the true mark, it is evident that they must destroy a prodigious number of birds in a year. I will leave the Canada hawks to their rivals—the sportsmen. Each of them should kill his hawk annually, as a tax for the privilege of hunting. They are easily shot from a blind, near which a bird or hare is hung up. Our native hawks may, most of them, be trapped, the blue-winged in steel-traps, baited with a bird, a squirrel, or even a stuffed squirrel-skin. The large red-tailed hawk can be caught in a very strong tobacco-stick trap, baited with the lungs of a pig or lamb.

I once knew an old gentleman, who had a thorough passion both for shooting and trapping all the hawks, owls, foxes, otters, minks, and other destructive vermin, he could find—a perfect Daniel Boone in the

midst of civilization. He had no particular objection to trapping a fox-hound occasionally, as he was convinced that hounds had been the chief instrument in destroying the game of the country. His labours convinced me that his occupation was very useful, for it was manifest that his neighbourhood abounded in birds far beyond any region near It is true he may have indulged a prejudice somewhat bitter against the objects of his pursuit, especially the hounds, yet some such feeling almost amounting to hatred, is perhaps requisite in destroyers of all kinds. He was a worthy man, and is remembered with esteem by all who knew him. I have known several men of less note who had the same turn of mind. They did a patriotic work; whether they designed it or not, I cannot tell.

Our article is becoming entirely too long. We will deal in short order with the remaining bird-killers. For their own sakes, the unfledged sportsmen should be stopped altogether, unless their parents are able to employ those capable of training them to handle arms safely, and restraining them from murdering harmless birds, through sheer wantonness, as unsportsman like and cruel. The smaller fry, of nest-robbers, should be treated with mild expostulation—which, failing, the rod must be tried.

This effort, hurried, miscellaneous, and unmethodical, is offered as the best testimony I can give of my kind feeling and gratitude towards my agricultural editor, who has afforded me so much pleasant reading so cheaply, and my best wishes for you, sir, personally, and officially, and for the cause in which you labour.

C.

Cumberland, Feb. 20th, 1860.

LIME WATER FOR APPLE TREES.—A French journal relates of a landed proprietor near Yvetot, that he had in his garden some old apple trees which produced no fruit. Two winters ago he took up some lime, which he steeped in water, and with a brush washed the old trees all over. The result was the destruction of all the insects; the old bark fell off, and was replaced by new, and the trees bore an excellent crop. Most of them have now acquired such renewed vigour, that all appearance of age has disappeared.

Remember the golden rule—do unto other as you would have them do unto you

For the Southern Planter.

Advice to Young Farmers.

Supposing that our young farmer friends have gone along with us in our former articles, and heeded us whilst we discoursed of house-building, the management of self, the management of tobacco beds, the management of the tobacco plant itself after being matured, &c., &c., we will now speak of other topics connected with the profitable management of the farm.

And here, lest the young Virginia farmer should be discouraged by the wonderful accounts he hears of the great product per hand, made in the cotton and sugar growing portions of our country, over what we are able to do in this State, we deem it pertinent to remind him, that in the improvement of his farm, the enlargement by *natural* increase of his stock in trade, the multiplication of his negroes, his cattle, his horses, &c., &c., he is adding, though slowly, much more certainly to his wealth than those who are engaged exclusively in the planting business.

The superior planting lands of the South, which produce these large yields to the hand, and are not subject to complete exhaustion, are confined to a comparatively small district of country. We would remind him that a very large majority of those cotton hands are deteriorating constantly, and that no successful plan has been resorted to of restoring them, that they are cultivated at a most enormous expense, that the net per cent. upon the capital invested is not so much greater, after all, as the inexperienced are led to think,—that we are led to doubt whether the sum of $5,000 or $10,00 invested here, would not show as good a profit at the end of twenty years as the same sum invested there, to say nothing of the superior comfort and satisfaction of living in this climate. To bring about this profitable investment here, however, the young farmer will have to be on the alert. As one step, he must attend to his

MANURE HEAP,

which is the farmer's bank; not like other banks, though, its contents must be *rotten*. If the President of this bank will see to it, that its resources are always in a good condition, he may rest assured that it will yield to him a far more certain and profitable

per cent. than any other banking institution, from the bank of discount and deposit to the farro bank, inclusive. The manure bank is the farmer's treasury. Thence he draws all his finances. Let all the material, of little or much strength, therefore, out of which nutrition for plant can be extracted be gathered together and converted into manure

Our experience is, that whether applied to corn, wheat or tobacco, turnips, carrots or potatoes, it makes return exactly in proportion to the quantity and quality of the manure applied. A judicious manager may every year make manure enough to dress thoroughly all the poorer portions of the fields he cultivates. Especially may he do so with the partial aid of the foreign manures so much in use now-a-days. We doubt, however, at the present high price, whether these can be extensively and at the same time profitably used on our Virginia lands, as far as we are from the good markets. Lime and plaster, where they act on our lands, may be used at all times most profitably; nevertheless, these great adjuvants to the growth of plants have been found to produce no effect on some of our Eastern Virginia lands, and consequently are to be used with caution. The Piedmont lands of the State may be increased to any amount of fertility by the judicious use of clover and plaster alone—a proper rotation of crops being observed; whilst, according to our experience, the soil between these and tide-water are not effected by the application of either lime or plaster. The lands of our State are so various in their character, that no one of the foreign manures can be recommended as adapted to all. This remark, however, does not hold good in regard to our manures of domestic manufacture.

We will suppose, then, that our young friend has, last fall, after the housing of his crop turned all his industry and attention to the accumulation of manure, that he has not depended on overseer or negroes in this most important operation, but given it his personal attention. The crop having been secured, he can't make it appear to either of these parties, that there is any need of further industry or energy. Therefore we press this point. Let the master be diligent in providing the material. Let him see that the stable yards, cow yards, the receptacles for manure about the dwellings are all, every one of them, provided with plenty of crude matter, such as weeds, leaves, straw, as absorbents of that which may be thrown or dropped on them, during the six months from November till April. Let him see to it, that the contents of both horse and cow stables when cleaned out are thrown into shelters where rains nor weather have access to them. Let him see to it, that they are kept deeply littered with straw or leaves. And when the time comes for turning the stock on the fields, let him see that a pen well covered with crude matter of some kind, is made for them on some poor spot of the succeeding fallow, and removed every ten days or so, and he will find that with the diligence he should have exercised, he will have accomplished so much towards going over all the thinner parts of the fields for cultivation, as to require but little of the more costly manures.

And here, being about to dismiss the subject, we would warn our young friends against the various preparations that are now sold for manure, unless they know the character of those making the preparations.

The season having arrived, viz: April and May, when the crop of corn is to be put into the ground, such manure as can be spared from the tobacco crop—for, from our experience, none of it should have been used as top-dressing to wheat during the winter, inasmuch as it does not benefit to the extent that others suppose—should be spread on the thinner parts of the corn field, and lightly plowed in. Before this process, though, we suppose the corn land all to have been thoroughly plowed and broken with the subsoil plow to the depth of at least twelve or fourteen inches. The corn should then be dropped (I prefer sowing it, a grain in a place three to four inches apart) and covered with one deep stroke of the coulter on each side of the row. As soon as the plant is up, or even before, should begin the

CULTIVATION OF THE CORN.

This process is simply the breaking of the middle of the row with five or six strokes of the coulter, so constructed as that it will go into the land and do the work thoroughly. Care should be taken not to break the roots of the young plants. Our plan, then, is, to disturb the land no more

until the corn is large enough to have the dirt thrown to it,—which is done with a common wing plow, one furrow being run on each side of the row covering, if plowed as it should be, every particle of land between the stalks of corn. Having gone over the field with two furrows of this kind to the row, we return and give the row two more furrows, which operation will have left two to three furrows more in the middle of the row yet to be finished, which if the wheat harvest has come on, as it should do, will have to stand until the wheat is saved, with no detriment, however, to the corn, because its young roots will not have progressed one inch beyond the two strokes of the plow on each side of the row that have already been given it.

Immediately on the securing of the wheat harvest—that is, the cutting and putting into nicely capped dozens—the finishing touch should be given to the corn by filling out the remaining furrows; and during this process the wheat, while the dew is on it of a morning, may be put into larger or five bushel shocks, and thus more securely kept in case of long rainy seasons. By this system of cultivation, we avoid disturbing the young roots of the corn plant, and prepare for them always in anticipation a soft, fresh, and well pulverized body of earth, in which they may seek their food.

For this cheap and expeditious mode of the cultivation, we are indebted for our theory to the celebrated agricultural chemist, Liebig, and for the practice to two or three of the most sensible old farmers of our acquaintance, who possibly may never have heard of the great chemist.

We rarely use the hoe at all in the cultivation of our corn, except to uncover such of it as the plow may have accidentally covered, and to chop the bushes which may and do put up in many parts of the field. And just at this season the young farmer will remember that the crop of oats is coming fast to maturity; and he will remember, also, that tobacco, which we told him in a former paper, he ought to have run over hastily—by moonlight if he had no day time for it. If he has followed our advice then, he will have plenty of time now to give the tobacco that thorough working with plow and hoe we there told him about, because it is free from weeds and grass, and the hoes will go over it as fast as the plows. The tobacco will now be as large as a man's hat, and in some cases in top, and a large, flat hill should be put round it in order to retain as much moisture as possible, but deep and thorough cultivation will insure the retention of this moisture more than anything else. But before we proceed further, we would give our experience in

FEEDING WITH CORN AND OTHER GRAINS.

We give it as our decided opinion, from our own as well as the experience of others, that the grinding of all grain fed to stock will save *one-fourth*, in some cases more. All grain fed to horses, cows, beeves, and fattening hogs, should be ground. Though the farmer have to travel ten miles to mill, the thing can be attended to with immense saving. Fattening hogs may be fed on corn cooked in large boilers; but still the process of fattening is hastened by the grinding and cooking. The want of attention to things of this sort, is where the Virginia husbandry fails. We make, but we do not economize. Suppose the farmer require 200 bbls. of corn for his annual support, and our position is true—and we know it is,—in the article of corn alone, he saves 50 bbls., which is worth on an average $175; a sum sufficient to pay a hand to do nothing else but prepare to feed and distribute to the stock. But the farmer who has stock enough to employ a hand exclusively for the purpose of feeding, would, under the ordinary plan, use 300 or 350 bbls. of corn; this man's saving would be $304. Dosen't this pay for grinding? Let our young brother attend to these things, and he will at the end of twenty years (industry in other departments having been observed) have no reason to look with a longing eye towards South Alabama or Texas, or any other great cotton region.

THE GRASSES,

Such as clover, orchard, timothy, &c., should have been sowed on the oats at the time of seeding them, and all the poorer portions of the field should have been covered with straw, so thinly distributed as that the young plants may be shaded but not overlaid. This covering, together with a bushel of plaster to the acre, will generally insure a good stand, which should then be sacred ground, so far as any quadruped is concerned, until the grass has matured the second year; the fields having been plastered the intervening seasons.

THE SEASON FOR SOWING WHEAT.

The season for sowing this crop having come, our young friends will, before this, have fallowed all the land intended for wheat, and as soon as the manure receptacles about the dwellings and farm-houses were emptied in the spring, (April and May,) will have seen that they were again filled well, with such matter as could be converted into manure, and will insure a sufficient supply for all the poor places in the fallow-field. This manure, together with the cow-pens that have been distributed over the thinner portions of the land intended for wheat, should all be plowed in, and then the wheat sowed at the earliest possible time after the 25th September. We would advise the use of the drill by all means, wherever the land is tolerably level, more especially on the red lands where the wheat is apt to be thrown out by frost. This operation will require the greatest amount of care, however, as with all the precision that may be used, the drill is liable to get out of order and to skip the land without dropping the seed.

STOCK OF SHEEP, HOGS, &C.

As it regards sheep, we would advise a good stock. Though they may cost more at first, they are far more prolific and a dozen will soon stock an ordinary farm. They require great care, especially about yeaning time. Indeed, until the farm is fenced off and well set in grass, this branch of husbandry should not be attempted It is absolutely needful that they have green food, to succeed well, and to insure this, at the time they are raising their young, the ram should be kept from them until the latter part of November, so that, going as they do four months with young, they may bring them the last of March or first of April. Frequent change of range is essential to their well-being, consequently their pasture should be changed monthly or oftener. The lambs should be altered as soon as they drop; this being attended to, they are always healthy and strong, and take on fat far more readily. We prefer a cross of the Bakewell and Cotswold, as combining a fineness of wool, a delicateness of flesh, and at the same time a juiciness which neither of those stocks have of themselves, and this, without detracting from the fleece.

As it regards hogs, our experience will not jutify us in recommending particularly any of the various recent importations. So much depends upon the attention that is bestowed on this stock, that we can say, safely, that any of good form, and size, and age may be bred from with propriety, provided that they be not suffered to "breed in and in" for too long a time. We dare say that the Surry, or the Berkshire, or a cross of the two would be our choice. Our experience in this department, as in that of the sheep, and indeed other stock, is, that without the attention of the master—*without the daily attention*—our friends will find that they may make yearly importations of the best breeds, and they will all resolve themselves into "Razor-backs" very speedily. If they want to see their sheep have lambs, their sows have pigs, their cows have calves, their acres produce "two blades of grass where but one grew before;" let them not depend on their "good men Fridays," as an old friend of ours used to call those gentlemen agents or managers.

In these sage advices which we have been so long doling out to our young friends, let them not suppose that we have talked unadvisedly about painting cow stables, and horse stables, and negro quarters, &c., &c. If we were going to start in life again, instead of burdening ourself with a large debt for land, the payment for which takes all one's surplus capital, we would take half the capital for investment in land, if it didn't buy but one hundred acres, and invest the other half in improvements for that one hundred acres.

The Yankee farmer---but we forget, we must not mention that name to Southern ears polite, "odds pistols and *pikes* it raises ones passions!" but having named the accursed name, we had as well say what we were going to say—viz: that the Yankee farmer invariably observes this rule in making an investment, and the consequence is, that he rarely, after four or five years, realizes less than from twenty to twenty-five per cent. on each investment.

And now, if our young friends are not glad that we have finished what we had to say, we know that we ourselves are.

L. M.

February 21*st*, 1860.

Plow your ground deep---pulverize it well.

Powhatan Hole and Corner Club.

Most cheerfully do we publish the following interesting report, in compliance with the resolution of the above club. We have often invited such communications from the various intelligent associations existing in many of the counties of the State, but we are sorry to add, that our solicitations have been, for the most part, disregarded. The Nottoway club stands out a prominent exception. Their annual contributions have enriched our pages, and made the "Southern Planter" the medium for diffusing the light of their eminently practical and instructive essays throughout the country. The Powhatan club, too, is another exception. Their communication of the invaluable agricultural and geological survey of their county by Professor Gilham, through this paper,—if they had done nothing more,—would entitle them to a full acquittal from the general charge, and to the praise of having set an example worthy of the imitation of every county in the State. The Albemarle clubs, we know, are still active and efficient, but we have somewhat against them; they are appropriating the benefits produced by their association and frequent intercourse too much to themselves. Why put their light under a bushel? Why not let the practical experience of one of the high-farming counties of the State be merged in the common stock? What do any of you know that you did not learn from others? Much, no doubt—but do you not owe it to others from whom you have derived instruction, to impart to them what you have learned from your own experience and observation? No man liveth unto himself—*verbum sat sapienti*. What shall we say of those counties in which there are no farmers' clubs? Brethren! you are verily behind the time. Gird up the loins of your minds and *immediately* set you about to wipe out the reproach. What a powerful auxiliary such associations, in every county, would prove in effectuating the reforms, which it is the purpose of all classes of our citizens to introduce—

That is, to rely upon *themselves* as a community; to encourage our own manufactures by buying nothing from the North which can be made at home; to ship our productions in our own bottoms to foreign markets and import our own supplies; and in short, to leave nothing undone which individual and associated action can accomplish to develop our resources of trade, of wealth and of independence. Think of it. But to the report before us:

Report to the Hole and Corner Club of Powhatan, on the subject of the Tartar Sheep and Sorghum. By C. C. Lee.

JULY 1st, 1859.

At a former meeting of the club I presented for the inspection of its members "the American Farmer's New and Universal Hand Book," lately printed in Philadelphia, and edited by J. W. O'Neill. Among the many things of great interest and value in this valuable publication, I called the attention of the club particularly to what was said of the Tartar sheep and Chinese sugar cane. Many of the members of the club were so impressed with what was there said of the Tartar sheep, that they requested me to obtain, if I could, further information concerning them, and where and at what price they could be bought. In answer to my inquiries on this subject, I received a very obliging letter from Mr. O'Neill, editor of the "Hand Book," from which the following is an extract:

"Dr. Emerson has had some six years' experience in raising the Tartar sheep, and not only fully endorses all I have said about them, (in the Hand Book,) but says that they endure the cold equally as well as the common breeds. As an instance of their prolific qualities, he refers to a ewe which brought forth *three* lambs, (two ewes and a buck,) in February of '54, all of which were raised to maturity. About the middle of November, of the same year, she brought two more lambs, and at the same time *her two February lambs each brought a lamb—thus making the progeny in nine months no less than seven.* He says he has frequently seen four lambs at a birth, and never, except in the case of young ewes, as above mentioned, has he known of less than two. He has crossed with other breeds, at different times, but without any satisfactory results, as I judge—for though the fleece was improved, and the meat of equally fine flavour, yet the cross was not equally prolific with the original stock, and he has returned to the breeds of the full bloods.

"The fleece is light and adapted only to the manufacture of blankets, and other coarse woollen fabrics. Dr. E. offers to supply you with a buck and two ewes of sufficient age to breed next spring, delivered in Philadelphia, for the sum of $50, which is $16.66 each—a very moderate price for fancy sheep. Some of his bucks have netted him $50 each. It would probably be as

well for you to communicate with him direct. His address is, 'Dr. Governeur Emersen, 926 Walnut street, Philadelphia.'

"As you have planted the sorgho, and may probably wish to experiment on sugar, I will, in a few days, if I can obtain it, send you a printed copy of the details of experiments made by Joseph S. Lovering, of our city, (Philadelphia,) one of the most practical and successful sugar refiners in the Union."

I have since received from Mr. O'Neill the promised little pamphlet, which I will hand to the club with this report, deeming it however proper to copy and read here the result of the experiments it details, which is given (page 21) under the head of

"SYNOPSIS."

"1st. That it is obvious that there is a culminating point in the development of the sugar in the cane, which is the best time for sugar-making. This point or season I consider to be, when most, if not all the seeds are ripe, and after several frosts: say when the temperature falls to 25 or 30° Fahrenheit.

"2d. That frost, or even hard freezing, does not injure the juice nor the sugar; but warm Indian-summer weather, after the frost of hard freezing, does injure them very materially, and reduces both quantity and quality.

"3d. That if the cane is cut and housed, or shocked in the field when in its most favourable condition, it will probably keep unchanged for a long time.

"4th. That when the juice is obtained, the process should proceed continuously, and without delay.

"5th. That the clarification should be as perfect as possible by the time the density reaches 15° Baume, the syrup having the appearance of good brandy.

"6th. That, though eggs were used in these small experiments, on account of their convenience, bullock's blood, if to be had, is equally good; and the milk of lime alone will answer the purpose; in the latter case, however, more constant and prolonged skimming will be required to produce a perfect clarification, which is highly important.

"7th. That the concentration or boiling down, after clarification, should be as rapid as possible, without scorching—shallow evaporators being the best.

"With these conditions secured, it is about as easy to make good sugar from the Chinese cane as to make a pot of good mush, and much easier than to make a kettle of apple-butter."

I will only add to this synopsis the comparison given on the page which begins it, between the yield of the sugar cane of Louisiana and that of the sorgho cultivated in Pennsylvania:

COMPARISON.

Louisiana.

Yield of juice per acre,	2,236	gals.
Yield of sugar per gallon of juice,	76	lbs.
Yield of sugar per acre,	1,704	"
Yield of molasses per acre,	102	gals.

Pennsylvania.

Yield of juice per acre,		1,847	gals.
Yield of sugar per gallon of juice,		66	lbs.
Yield of sugar per acre,	Actual,	1,221	"
	Probable,	1,612	"
Yield of molasses do.,	Actual,	74	gals.
	Probable,	84	"

As every member of the club is as competent as I am to draw conclusions from experiments, I shall refrain from commenting upon them, and extract another paragraph from the letter of my friend, Mr. O'Neill. Immediately following those already extracted is the following:

"Truly glad am I to learn that Virginia contains such a nucleus of progressive spirits as is comprised within your agricultural club. Association and combination are the great levers which move civilized society, and through them only can great results be obtained. Your efforts may now seem to meet with but little reward, yet, by perseverance year after year, in spite of every discouragement, you *must* and *will* effect a radical change in your own vicinity, and by indirect means in other quarters."

It is, Mr. President, to produce the result predicted, I trust not erroneously, in the last extracted sentence from my friend's letter, that I have made this report in writing, instead of verbally. I have thought that the introduction of the Tartar sheep and the sorgho into our husbandry might be beneficial to our vicinity and Commonwealth, and a large portion of our country, and that the publication of these views, made in our agricultural papers, by the recommendation of this club, may call public attention to a due consideration of them, and that it might lead also to a due appreciation of the Farmer's Hand Book, whose

suggestions and recommendations have led to this report. I have looked carefully through it, and find it to be such a work as every farmer ought to have; and I have called the attention, not only members of this club to it, but other farmers, and all unite in confirming my opinion. In contemplating the vast importance and variety of the subjects treated of in this volume, every one of which should come within the purview, and most of them be embraced in the practice of the accomplished agriculturist, one is most forcibly impressed with the surpassing utility and true dignity of his calling. The effects of climates, the nature of soils, the cultivation which will destroy and that which will improve them—the products of the earth in grasses for his cattle, in herbs for his medicines and indulgencies, in cereals for his necessities, in fruits and vegetables for his luxuries, in flowers for his elegancies, with the knowledge of all of which, and how they should be treated, should he be familiar. Then come the fibrous plants for clothing and cordage, with their seeds for oil, and others with juices to tinge our garments with the colors of beauty—then all the varieties of cattle for food or servitude—then all the feathered tribe, which increase our luxuries, and sustain our health, and adorn and make merry our bowers—then the insects, which help or which harm us—the name of the farmer being the bee and the silk-worm, and that of the latter legion;—then the mechanical knowledge requisite for the buildings and improvements of husbandry, and then the utilitarian discernment, the adorning fancy, the judgment, the humanity and taste; with which, all these means of the farmer's livelihood, sources of his wealth and materials of his happiness, should be maintained and increased and managed in the best manner, require an exercise of intelligence and industry and benevolence and taste demanded by no other profession. It is to impress upon the farmer, by the sight presented in one volume, of the large round of his duties, the importance and elevation of his calling, as well as to give him a complete and lucid manual of instruction in all of them that I hope it will please the club to commend to the public as heartily as I am sure they approve it—the Farmer's Hand Book.

There is no condition so secure, as not to admit of change.

From the New England Farmer.

Coal Ashes as a Fertilizer.

FRIEND BROWN:—Your paper is taken at our office by A. H. Grosvenor, for the general instruction in agriculture gardening, &c., at our section of the Shaker Village at Harvard. Among the farmers' reading matter it contains, I have been pleased to observe, an occasional article upon the general uses of coal ashes as a fertilizer.

In your last issue, the editor of the *Commercial Bulletin* has presented to the public a good article on this subject, but in perusing it, I was led to suppose that many disposed to be skeptical on this subject would argue that the editors' test of anthracite coal was not a clear one, because he incorporated with said ashes equal parts of horse manure and loam in one general heap, as an auxiliary to his pleasant half acre.

Such skeptical friends would be apt to contend that the horse manure did all the work, while the ashes, like the white, soft-handed gentleman farmer that simply rides through his plantation, received the honor, and made all the noise. But as we too think different, please allow us to state our reasons for endorsing his opinion.

We consume at our large dwelling-house a number of tons of coal each winter, and having added portions of it to our composts, with little caleution or observation, we determined to test it singly this past season, and closely observe its effects. On an old mowing field too much run down, we top-dressed a square piece of ground fairly with clear coal ashes early in spring. While the crop was growing, at all stages the difference was perceptible. When ready for the scythe, it was more in quantity; and as to quality, it produced about equal parts of herds grass and red clover. If the clover was not introduced by the agency of the ashes, we know not how it was introduced, for four years none was seen there before, or in any other part of the field, and this was the only clover seen in said field the past season. Both grass and clover were more vigorous, green and lively within the top-dressed square, and just as visible all around was the exhausted crop, which said as audibly as grass could say, in its declining state, that it had received no such assistance from this individual fertilizer.

On a hill-side not at all renowned for its wealthy properties in soil, we planted the

Davis Seedlings and Jenny Lind potatoes in clear coal ashes, half a shovel full in a hill. Below, on equally as good ground, we planted the same kinds of potatoes in compost manure, and the coal ashes single handed, turned out the largest, best, fairest and most numerous quantity of potatoes. In reality, they were the best we raised on the farm. Almost side by side, in compost manure, our potatoes were somewhat infected with rot; in the ashes they were all healthy and sound almost to a potato.

In kindling fires, it is true, we use shavings and a little light wood, but the quantity I consider almost too insignificant to take into the account.

These experiments convince us that as a fertilizer, anthracite coal ashes possess the life and energy to produce the above effects on common crops. Hence, whatever theoretical lecturers or writers may present to undervalue the better qualities of the article, while it continues to improve quantities and qualities of grass, and give us sounder and larger crops of potatoes, we conclude to give it an honorable standing among the general agents which have long held undisputed station in the farmers' compost.

WM. LEONARD.

South Groton, Oct., 1859.

Chemical Properties of Tobacco.

During the process of curing, tobacco undergoes important chemical changes. Its peculiar properties are owing to the presence of several remarkable compounds, of which one called "nicotine," and another called "nicotianine," are most important.—*Nicotine* is an alkaline substance, and has the form of an oily liquid when separated from other compounds. In its concentrated form, it is a most deadly poison; but when taken in the dilute condition in which it reaches the stomach in chewing, or lungs in smoking "the weed," its effects are greatly modified. The quantity of nicotine varies in the different qualities of tobacco cultivated in the same region, and still more does it vary in that cultivated in different countries. The Havana has about 2 per cent of nicotine—hence its mildness. Virginia (best manufactured) tobacco has 5 or 6 per cent, while the stronger varieties have about 7 per cent. The French tobacco has from 3 to 8 per cent of nicotine, according to the region in which it grows. *Nicotianine* is a more volatile substance than nicotine, and is more odoriferous. The pleasant odor of good tobacco is due to this compound chiefly.

The nicotine and nicotianine do not exist in the green leaf, but are formed during the curing of the tobacco, from substances already in the plant in variable quantities. If the leaves are dried very rapidly, these compounds are not fully formed; and if the heat is raised too high in firing, they may both disappear to some extent, by being either volatilized or decomposed. They both contain nitrogen, and, like all other compounds containing that element, are readily decomposed. Hence the firing should be commenced at a low temperature which should be gradually increased, and may be advantageously suspended at night. The temperature should never rise above 120°.

Tobacco-barns should be closely planked, or in some way made close, having windows for ventilation, which may be opened or closed at pleasure. Smaller, and hence safer fires, will be sufficient in such houses. Curing yellow tobacco with *charcoal* at a high temperature, kept up day and night, is recommended.

"It is best to fire all grades of *shipping* tobacco, and cure it a dark nutmeg color. * * * From 24 to 36 hours after cutting, if the tobacco is ripe—if not, from 36 to 48 hours, according to the weather—seems to be about the right time to commence firing. Begin with small fires, and bring the tobacco to a proper state, and then increase the fires."

Rope Making.

The name "rope" is generally applied to the larger descriptions of cordage, such as exceed an inch in circumference, though the principles of formation are much the same for cordage of every size, and the smaller sizes are known by various names. Those large ropes which are said to be cable-laid are formed by the combination of smaller ropes twisted round their common axis, just as the shroud-laid ropes are composed of strands twisted round their common axis. As cable-laid ropes are harder and more compact than others, this mode of formation has been adopted for ropes to be exposed to the action of water, even though their thickness may not be very great. Ropes formed by plaiting instead of twist-

ing are made use of for some purposes in which pliability is especially needed, they being more supple and less liable to entanglement than those of the ordinary make; such ropes are generally preferred where the rope has to pass over pulleys of small diameter. Flat ropes, which are valuable for special purposes, are either formed of two or more small ropes placed side by side, and united by sewing, lapping, or interlacing with thread or smaller ropes, or of a number of strands of shroud-laid rope similarly united. In either case it is necessary that the component ropes or strands be alternately of a right hand and left hand twist that the rope may remain in a quiescent state.

Many experiments have been made to test the loss of strength by the ordinary twist given to ropes. DUMAHEL prepared the following statement to show the comparative strength of ropes formed of the same hemp, and the same weight per fathom, but twisted respectively to two-thirds, three-fouths, and four-fifths of the length of their component yarns. In rope of two thirds twist, the weight borne in two experiments was 4,098 and 4,250 pounds; three-fourths twist, 4,850 and 6,753 pounds; four-fifths twist 6,205 and 7,397 pounds. The result of these experiments led DUMAHEL to try the practicability of making ropes without any twist, the yarns being wrapped round to keep them together; these had great strength, but very little durability. In shroud or hawser-laid ropes the usual reduction of length by twisting is one-third; but cable-laid ropes further shortened, so that 200 fathoms of yarn are required to make 120 of cable. A hawser-laid rope 6 inches in circumference by 120 fathoms long, weighs about 10 cwts.; a cable-laid rope 12 inches in circumference and 120 fathoms long, weighs 36 cwts.; a hawser-laid rope 6 inches in circumference will bear a weight of 140 cwts. The tarring of ropes somewhat impairs their strength, but renders them more durable.

SWEET POTATO PIE.—Boil the potatoes very soft, then peel and mash them. To every quarter of a pound put one quart of milk, three tablespoonsfull of butter, four beaten eggs, together with sugar and nutmeg to the taste. It is improved by a glass of wine.

Good stables save good hay and grain.

Effects of Heat upon Meat.

Prof. Johnston, in his Chemistry of Common Life, says that a well cooked piece of meat should be full of its own juice, or natural gravy. In roasting, therefore it should be exposed to a quick fire, that the external surface may be made to contract at once and the albumen to coagulate, before the juice has had time to escape from within. The same observations apply to boiling; when a piece of beef or mutton is plunged into boiling water, the outer part contracts, the albumen which is near the surface coagulates, and the internal juice is prevented either from being diluted or weakened by the admission of water among it. When cut up, therefore, the meat yields much gravy, and is rich in flavor. Hence a beefsteak or mutton chop is done quickly, and over a quick fire, that the natural juices may be retained. On the other hand, if the meat be done over a slow fire, its pores remain open, the juice continues to flow from within as it has dried from the surface, and the flesh pines and becomes dry, hard and unsavory. Or if it be put in cold and tepid water, which is afterwards brought to a boil, much of the albumen is extracted before it coagulates, the natural juices, for the most part flow out, and the meat served is nearly tasteless. Hence to prepare good boiled meat it should at once be put into water already brought to boil. But to make beef tea, mutton broth, and other beef soups, the flesh should be put in cold water, and this afterward very slowly warmed, and finally boiled. The advantage derived from simmering—a term not unfrequent in cookery books—depends very much upon the effects of slow boiling, as above explained.

SELF-GOVERNMENT.—Parents! to which danger had you rather expose your son—to the danger of an ungoverned *horse* or his ungoverned *self?* Depend upon it that "self" needs government, before your son is safe to enter upon the career of life more than his horse needs "breaking" before he can venture to trust him for a safe journey. As you love your boy then, see to it that he is governed and well governed when young; then will he go far and high in the career of usefulness and happiness of life. Teach him to govern himself *first*, and then he will be able to govern every thing that need be brought to his service.

From the Southern Farmer and Planter.

A Practical Paper upon Gardening, Ditching and Improving Land.

To which was awarded the premium of Twenty Dollars, by the State Agricultural Society of South Carolina, at its Annual Meeting, in November, 1859.

BY D. WYATT AIKEN.

INTRODUCTION.

In agriculture, theory and practice are by no means correlative terms. Theory depicts the planter's life one of ease, and portrays his arduous labors a task of leisure, while it flatters the sluggard, equipped with a little scientific knowledge, that planting, of all other pursuits, should be his. In theory "Paul may plant and Apollos may water," and the increase follows *ex necessitate.*

Theoretically, stimulating manures have only to be heaped upon all lands indiscriminately, and fat harvests will be reaped; or gullies are prevented by tapping the subsoil; or the level has only to be applied, and hill-side ditches are located. Theoretically, grain must be sown in level furrows, or seed must be planted upon horizontal beds, to prevent the escape of the virgin soil. In fact, theory in agriculture attaches plausibility to the most visionary schemes.

How different is the result of actual practice! Practically, agriculture climbs high in the scale of sciences; it developes thought, matures judgment, and requires, for execution, untiring energy, perseverance and industry. The skillful planter stops not to theorize about the result effected by certain means applied; plow in hand, he grapples with the soil, sows his seed, vigilantly watches the progess of his growing crop, and after assiduous cultivation, at harvest time anticipates a yield commensurate with his unabated zeal. It is he who understands best the caption of this essay, and knows that the improvement of land consists in increasing its productive capacity. Nor does any one know better than himself that this end is attained in three ways:

1st, by ditching, *i. e.* hill-side ditching, draining and bottom ditching.

2nd, by cultivation, *i. e.* horizontal and grade culture.

3rd, by rotation of crops and manuring.

The first step, then, towards improving any plot of exhausted undulating land, is the location of a series of ditches, so arranged as to empty, with least detriment to the land, all the surplus rain-water into the creek or branch bottoms below, or into the adjacent forests, or in some direction out of the field. To do this effectually the land must be studied. Its elevations and depressions must be studied; they must first be seen by the eye, and then made more perceptible by applying the level. The most practised eye should never venture to locate a ditch without the assistance of the level, in hilly lands, and the more moderately undulating the land, the more difficult the task, and the more judgment required to accomplish it successfully. It often happens that the particular inclinations of a large field are westward, while the general declination of the land is eastward, and *vice versa*, so that the level, when giving sufficient fall to the ditch, seems to the eye to be laying off a perfectly level line.

The nature of the land being understood, the next question is, where shall be the mouth or the source of the ditch. If the mouth be determined upon, commence there, and with the level run backwards or up the ditch, always following, and never straining or forcing the level from its indicated direction. If the source can be more easily fixed, apply the level there and run towards the mouth, always observing one absolute requisite in hill-side ditching, viz: never let any part of the ditch near the source have a greater fall than any portion between this point and the mouth; for if such should be the case, the water in this steeper portion, having an accelerated motion, becomes retarded as it reaches the leveler section, deposits its rolling sand, and heaps up upon the water in advance, and most probably causes a break in the ditch-bank just there. Where sudden curves occur in circling abrubt knolls, the ditch should be made wider and not steeper than the succeeding portions.

The general direction of all ditches, if practicable, should be down the branch; for the water must, sooner or later, reach the bottom, and the lower down the bottom it is emptied from the ditches, the less injury sustained by the bottom lands above.

The distances between ditches should be best known by the planters upon their respective farms, depending upon the declivities of the land and the nature of the soil. On steep hill-sides, ditches should be distant from each other from twenty to thirty

yards; upon gently inclined planes, from sixty to two hundred yards; upon stiff clay lands, close together; upon loamy soils or sandy lands, further apart. In a similar way should the fall of each ditch be determined, varying from two to four inches in every twelve feet, always observing to have the first or upper half of the ditch slightly more horizontal than the last or lower end.

Where the land is to be horizontalized, the ditches should have somewhat more fall than where the grade system is adopted, simply because where the horizontalization is complete, not enough water flows in the ditch to wash it into a gully; and when a freshet occurs, any water-furrow filling up and breaking over, produces a "wash" from this point in a straight line to the ditch below, and empties into the ditch at right angles, to its bank, a column of water which will certainly wash away the bank, unless sufficient fall is given to the ditch to change the direction of the water before this result is produced. In the grade system, where the ditch receives constantly the rain-water as soon as it begins to flow in the water-furrow, the injury to the ditch bank is not so great, because the ditch carries off the water gradually from its commencement to flow.

To make a hill-side ditch, run the first furrow with the level; on the upper-side and close to this furrow run three other furrows with a common shovel-plow. Draw the earth from these four furrows, with hoes or scoops, to the lower side of the first furrow. Then require all hands there at work to walk several times the entire length of the ditch upon this earth, thereby compacting it for a bank, while the plowman is running three more furrows just where the last three were run. Treat this earth the same as before, and run two more furrows on the upper side of the ditch, draw out the dirt, walk the bank thoroughly, and the ditch is complete, with an almost level bottom, there being a slight depression on the side next the hill.

If a ditch should withstand the ordinary rains of a season, and break over during an extraordinary freshet, it should not be abandoned, but should be deepened for ten or fifteen feet on either side of the "break," sufficiently to furnish earth for a new bank and to fill up partially the "wash" recently made, as far as the earth can be thrown with the shovel. These sinks in the ditch act as deposits for the soil otherwise washed away, and can be emptied at leisure by scattering the sand in the wash below, which, when mixed with the clay previously thrown there, produces an improved soil.

DITCHING WET LANDS.

Wet lands cannot be drained by hill-side ditches, but must have drains dug for the purpose, either blind or open drains. From the lowest spot of the wet plot (found by the level) run a straight line to the nearest point, where an exit from the field or into the creek can be obtained; along this line dig the ditch circling, if necessary, any intervening or immoveable obstruction, and when complete, observe if the water follows the course of the ditch. From the point where this drain began, continue the ditch through the wet spot until its source reaches the opposite side, or perhaps the highest point of the wet land. To be most effectual, the ditch should be left open. If necessary to be closed, lay tiling in the bottom, and throw the dirt back upon this tiling. If tiling is not at hand, many substitutes can be had by the planter. Three pine poles pealed, (the larger the better,) and two of them laid in the bottom of the ditch, and one just over these two, make a capital underground trough. An occasional rock thrown into the ditch covered with slabs, the sawed face downwards, answers a good purpose. The ditch half-filled with small stones, these covered with brush, and the ditch filled with dirt, is the best method of underdraining.

I once owned a sour spot of land contiguous to a road, in which there was always a mud-hole. Along the edge, and through the whole length of this sour pot, parallel to the road, I dug a ditch three feet deep and eighteen inches wide. From the middle of this ditch, and at right angles to it, a similar ditch was dug across the road, opening into the hill-side below. These ditches were filled eighteen inches deep with small stones, and the earth previously taken from these ditches returned upon the stones. To this day the road is dry in moderately wet weather, and that sour spot of land mellow, fertile and productive.

In draining wet spots on bottom lands, the draining ditch should always be run in a straight line to the creek or branch, entering the same at an acute angle, and the dirt

from this ditch invaribly thrown on the lower side of the ditch.

DITCHING BOTTOM LANDS.

The protection of bottom land, by a successful system of ditching, involves an outlay too heavy to be borne by the majority of planters, particularly in the middle and upper Districts of our State, and hence the unsightly banks of sand, the decayed and dying timber, the crooked streams, and the prevalence of sickness on almost every plantation containing more or less of these valuable bottoms. Many planters, too, are prone to charge their willful neglect in this matter upon their next neighbor below. They say, "he will not ditch below, and hence, ditching mine is only digging a ditch to be filled up with sand." Such a plea is unwarranted, because any bottom worth the labor to be bestowed can be successfully ditched, and protected in cultivation, regardless of the bottoms above or below.

Before the main ditch is dug, drains should be cut on each side of the bottom, through its entire length, and just where the adjoining hill-side and bottom come together. The size of these drains is, of course, dependent upon the quantity of water flowing from the hill-sides after a heavy fall of rain, or upon the uses to which they may be put. If the bottom is to be enclosed with a fence, these drains may be three and a half feet wide at top, one foot at bottom, three feet deep and all the dirt thrown on the lower (or branch) side. Upon this bank an economical fence may be built, while the drain answers the purpose of carrying off the rain-water coming from the hill-sides. If care is taken to give these drains a fall of one inch in twenty feet, and their exits made at the lowest ends of the bottom, the water they contain is kept entirely from the volume, which usually flows in the branch. These drains finished, the main ditch must be dug, which should only follow the channel of the branch when it is in the lowest part of the bottom, (which is not always the case,) or when it is nearly straight. The ditch should always be straight, in the lowest bed of the bottom, and large enough to draw the water of all ordinary rains. Unless, from necessity, it should never run through the middle of the bottom, but have at least two-thirds of the bottom behind the bank, there being but one bank to the ditch; then if the ditch has to encounter a freshet, only one-third of the bottom crop is liable to be overflown, as the water in this third must be as deep as the ditch bank before the two-thirds behind the bank can be injured. If the ditch be in the middle of the bottom, only one-half the crop is protected; and if the dirt be thrown on each side of the ditch, making two banks, either or both are liable to be destroyed, and the entire crop lost. These ditch banks should be made solely of earth, unless a foundation cannot be obtained without the use of logs. Logs and brush put into a bank, made to confine running water, are oftener than otherwise an injury to the bank. At such places leakage is almost certain, and where either the logs or the brush project from the face of the bank, the constant laving of the water will, sooner or later, undermine the bank or percolate through behind the logs, and ultimately create a "crevace." If properly ditched, no lands remunerate the planter more handsomely than his bottoms. If improperly ditched, no lands subject him to a greater and more useless expense.

SYSTEMS OF CULTURE.

Some agricultural writers are accustomed to speak of the different systems of culture. I incline to the opinion there should be but two systems of culture, viz: The horizontal and the grade systems. To speak of the up and down hill method of destroying land, as a system, is akin to calling ours a system of stock-raising, when our cattle and stock generally are turned out to seek a sustenance upon the unenclosed pasture lands of our neighbors. The one is as systematic as the other, and both equally condemned by charity and science.

Perfect horizontalization is certainly practicable, but that is sure protectection to both land and crop against freshets, however great, I hold to be an error. Innumerable causes, which the vigilant eye of the most skillful and energetic planter cannot prevent, will, at one time or another, produce "breaks" upon the hill-side, and often upon a comparatively level plot of land. A tree, a stump, a rock, an unfinished furrow, irregular plowing, and, most of all, shallow plowing, are all obstacles in the way of the horizontalizer. That these should discourage him, is no argument, however, against the horizontal system of cultivating our crops.

The prime necessity in preparing a field for horizontalization is, to protect it perfectly from all water except what falls upon it from the heavens above. The adjoining forests, or roads, should be so ditched as to prevent any water flowing into the enclosure, for it is most often the running water, and not the falling rain, which destroys the labor of the horizontalizer.

This prevention being effected, the planter is ready for his work, and begins horizontalizing by finding with his level, the highest point of the field, and the longest row or bed which passes through this point. The first corn or cotton bed may not be over ten feet long, and must be straight. On each side of this straight bed two or three more must be "laid off," each bending inwards at the ends, until it meets a fellow at the opposite side of the straight row. The plow team must never stop until the ends do meet, for stopping the team before the shovel reaches the end of the bed, leaves a mound in the water-furrow, which diminishes its capacity to hold water, and often causes a "break." This irregular plowing will certainly be done, unless each plowman is instructed as to his certain duty; *i. e.*, never to stop his mule until his shovel reaches the extreme end of the bed.

These few being finished, at a distance from the last bed equal to the space occupied by a couple of beds, apply the level. It will, directly, as you follow it, diverge from the last bed, and assume a direction possibly the reverse of that indicated by the eye. But the horizontalizer should always bear in mind, he is to follow the level, and not the level follow him. This guide-row now laid off by the level, may reach the opposite side of the field six or eight beds distant from the row from which it was but six feet at the commencement. This divergence, which is strictly a spirical angle, must be filled up by short rows, the first being "laid off" parallel to the long guide-row, and the return furrow parallel to the short completed bed, observing as above to make their angle of union complete, and not allow the plow to stop as soon as the *team* reaches the end of the row.

This much done, the planter begins again with his level three, four, five or six (never more) rows below the lower end of the last guide-row, and follows his level in the opposite direction from the row last run. This row may diverge and its end be five and twenty beds distant from the beginning of the row above. If so the level is again applied in the angle, and several short rows run, when the divergencies are filled in as directed above. If this method is followed, the lowest point of the field will ultimately be reached, and none of the work of to-day injured by the rains of to-night. The same direction should be followed in the cultivation of the crop—always begin on the highest point. If the planter begins to horizontalize at the foot of the hill, and climbs the hill, all the labors of to day may be destroyed by the rains of to-morrow. If galled places are to be encountered, the horizontalizer should not be deterred, but follow his level across them; it knows how to manage broken as well as smooth surfaces, and will turn the planter up as he approaches, and down as he recedes from these spots, without the assistance of a thought. If gullies are met with, they should be filled up by dams of stone, brush, pine-tops, with the straw pointing up the gully, or by driving stakes, a few inches apart, across the gully, and interlining willow or green limbs. The last span or two of the level being inclined slightly towards the gully, will, after a few heavy rains, furnish earth enough to partially fill an ordinary gully.

A field in small grain stubble, or one previously cultivated in corn or cotton, is more easily horizontalized than one freshly broken up, because the smooth, worn stubble land, or the regular and equal undulations of the cotton or corn beds, do not present so many irregular depressions as the newly plowed field. The surface, moreover, is firmer, and does yield to the weight of the level. As the field is laid off horizontally, it should be bedded "out and out" immediately, or the irregular ridges between the horizontal furrows, not being themselves horizontal, will occupy the space which should be occupied by water after a rain, and a break is often the consequence.

When one bed yields to the water, this running water does not stop until it reaches the hill-side ditch below. Its passage across the beds may be a straight line, or it may be a zig-zag rill, washing through one bed here and another there. To prevent these overflows entirely is practically impossible, for sometimes, falls of three, four or five inches of rain occur in a single afternoon; and this quantity of water will fill

up the water furrows and overflow the beds before the most thoroughly pulverized soil can absorb the half of it. On the 15th, 16th, and 17th of last May, my plantation was flooded by successive unusually heavy rains. My cotton, in stiff clay land, had been planted in a scooter furrow on the bed, covered by a double-footed scooter plow, and harrowed off as it was nearly all coming up. This harrowing had made the land comparatively level, and these heavy rains overflowed the entire crop in a sheet of water, without a perceptible injury to the land. Some of my corn was in sandy, loose land, planted on the top of very high beds, but had not been worked. The high horizontal beds became so saturated with water, and the subsoil failing to absorb it rapidly enough, they actually slipped, in regular land-slide fashion, down against the bed next below, without even diverting the young corn from its erect, growing position. No system of horizontal culture can survive such freshets. But they do not often occur, and their evil effects must be remidied afterwards, which I propose doing thus: Just where the break first occurs across any bed, a rectangular hole is dug, say eighteen inches wide, and three, four, six, or ten feet long, (as the damage done may require, parallel to the bed, and deep enough to furnish earth to replace the broken places in the next few beds below. The distance between this hole and the next hill-side ditch below is divided into so many equal parts, and at each point of division a similar rectangular hole is dug, furnishing earth for the breaks below, and so on to the ditch. Should the ditch break over, the same kind of hole is dug in the ditch to procure earth for a new bank. These holes will, in time, be filled up by the constant plowing beside and near them, and by the rain-water drainiug into them from the adjacent water-furrows, bringing along with it more or less soil or sand. The hole in the ditch will, after the first rain, be filled with excellent soil, to be scattered upon the washed spots below. If such rectangular holes be dug across gullies at small intervals from each other, and the dirt thrown on the lower side, they will rapidly fill up a gully, as the rain will soon fill the holes to their original level, with sand.

GRADE CULTURE.

The Grade culture is best adapted to hill-sides and wet spots. If the wet places are higher than the branch, they may sometimes be dried sufficiently for cultivation by deep plowing and a gradual fall given to each row towards the branch. Such places are generally dried by blind ditches. But on hill-sides this system is more feasible than the horizontal system, because it is impossible for a horizontal corn or cotton bed, on a steep hill-side, to contain all the water that falls into it. In practicing this system of culture, a furrow should be run by the level, with one inch fall to every span of the level, beginning at the highest point of the hill, on the side where the ditches empty, and running in a direction, crossing ditches, and not stopping until the hill is circled or the bottom reached. Fill in the angle as directed for horizontalizing, and, if short rows occur, they must have a slight inclination in the same direction. The reason for beginning these furrows at the mouths, and not at the source of the ditches is obvious. If a row with one inch fall begun at the source of a ditch having three inches fall, they must diverge from each other, and a furrow so run from the source of the second ditch, for instance, upon a hill-side, would very soon strike the first ditch above on the lower side or behind the bank, and having a descending grade, would empty its water against the bank and form a gully.

There are circumstances under which the horizontal is the most destructive system of culture:

In the first place, if the planter is not indefatigable and unceasingly watchful, all the little breaks over his horizontal beds will soon become gullies, never to be obliterated.

Secondly—If the seasons are too wet, his corn fires, and his cotton grows too much to weed. And if too dry, the roots of both corn and cotton are scorched. During the past season horizontalizing has been injurious to my own crop. An excessive drought of eleven weeks and three days baked the land until any little shower would deposit puddles of water in my horizontal water-furrows, which, when heated by the scorching sun, burnt the surface roots of both corn and cotton.

And thirdly—Horizontalizing requires the planter to be content with moderate crops and an improving plantation, in lieu of large crops and speedy emigration.

THE LEVEL.

The level being among instruments the planters' reliance, a description is probably requisite of the one I use, and so often spoken of in this essay. Several kinds of levels are recommended—some too tedious to handle, and others too complicated for plantation purposes. I use simply a rafter level of twelve feet span, made by my own negro carpenter, and altogether accurate enough for the planter. A plummet is ordinarily attached to this level, but where perfect accuracy is required, a spirit level is *hinged* upon the cross-bar of the level, one end being made stationary by a hinge, and the other free to move up and down.

In using the level, I take with me into the field a small boy, with a hoe. Placing the level where I wish to begin, he is made to dig a hole in front of each foot of the level. Starting in the direction I wish to go, the rear foot of the level is placed where the front foot stood, and as soon as the proper pitch or level is found, "chop," is cried by myself, and the boy digs another hole in front of the foremost foot of the level. This proceeding is continued to the end of the row or ditch. The fresh dirt from these holes can be seen for many yards, and are plowed through by myself, leading my gentle mule, and a trusty plowman holding the handles. I lead, following the course of the holes, and he holds the plow erect; no line is used at all. I greatly prefer this extra labour to the "gee" and "haw" movements of the very best plowman. Some planters use little sticks instead of digging holes with the hoe. The hoe is easier carried than an armful of sticks. If the level is followed, and never driven, it will never lead the planter astray.

The third, and probably most important point, in improving lands, is the rotation of crops, and the accumulation and application of manures. A few words will suffice for my views (which is my practice) on these subjects.

ROTATION.

Divide the plantation, as far as practicable, into four equal parts—as many fields as you please. Upon one of these fourths plant cotton, upon another corn, upon a third small grain, (wheat, rye, and oats—let the barley and turnip patches be pet lots near the house,) and allow the last fourth to rest. Prepare this resting fourth properly and thoroughly in the fall, for cotton the next spring. Plant corn next spring where cotton was this year, and sow small grain this fall upon the corn land of this year. The stubble land of this year rests next year.

A similar rotation may be made of the pet patches near the house. Put one in potatoes, one in barley and one in turnips; let the fourth rest. Sow turnips on the rested land; follows turnips with barley, and barley with potatoes. Sow peas on the resting land, and when ripe plow under peas, vines and all.

MANURING.

To improve land by manuring, every vestige of vegetable matter left on the land after harvesting should be plowed under, and nothing should be burned.

If foreign manures are to be used, as guano or phosphates, they should be rolled in moistened cotton seed. The lint will absorb the manure, and afford the easiest method of scattering it. This compost, when used on small grain, should be sown broadcast in such quantities as the planter thinks he can best afford it. For cotton or corn it should be drilled. I have always found the heavier the manure, *cæteris paribus*, the more abundant the yield.

From thirty to fifty bushels of raw cotton seed per acre, broadcasted, is fine manuring for small grain; and from twenty to thirty in the drill, is equally good for cotton or corn. My experience is, that cotton seed, composted with any kind of manure, is more profitable than the same quantity of either applied alone.

All home-made manures should be applied broadcast. A large bulk in this way covers but a small area of ground, but that area is productive for several years, it matters little what is planted upon it. In the drill or in the hill, such manures benefit the immediate crop, but they must be applied often to produce lasting effects.

A minute description of the *modus operandi* necessary to enlarge the manure heaps, does not properly belong to this essay, but the general methods of making manure may not here be inappropriately related.

In the first place, stated times and regu-

lar hands should be employed to collect trash, leaves, and litter for every spot where every kind of stock is required to stand or rest, night or day. The stables, the cow-house, the hog-pen, the sheep-house, and the lots surrounding these houses should be regularly littered. When this litter was well trampled in the lots, it should be raked up into large heaps *under shelter*, during dry weather; it should never be touched in wet weather. These heaps composted with cotton seed early in the spring, make the best possible manure for cotton. Stable, cow-house, or sheep-house manure, or all manures made under shelter, should be moved but once, directly from the shelter to the stubble land upon which cotton is to grow the following season. This stubble resting the entire year, may be manured or "broken up" whenever time and the season will admit. Manure hauled out in dry weather (for in wet weather neither wagon or hoof should enter a field) during the spring, or summer, or fall, and throw in heaps of ten bushels each, will remain upon this stubble until time can be had to scatter and plow it in without a material loss of any of its virtues. It is, however, easier and more economical to scatter manure from the wagon, and plow in as scattered.

In the second place, no rainy days should be lost on a plantation, unless the rain falls very heavily and constantly. The simplicity of machinery has superseded the cotton-card and spinning-wheel, so that it is cheaper to buy than make thread. The time heretofore devoted to such in-door work should be spent making manures—either turning over that already made, or raking trash for new heaps. To expose negroes in this way, however, is only economy when they are glad for the occasion. An oil suit can be made or purchased cheaply for each hand, which will, in one winter, save time enough to pay for itself, and it will last five or six years.

In the third place, a sink should be dug in some convenient place and sheltered, into which is thrown the chips and trash from the wood-yard, sweepings from the house-yard, slops from the chambers, kitchen and wash tubs, bones, occasionally a little lime, salt and sand, and every dead chicken, pig, turkey, and, in fact, everything useless about the premises that can be made to rot. This sink will furnish the planter annually with an amount of excellent manure, incredible to those who have never tried it.

In the fourth place, no planter should keep more stock than he can conveniently pen every night in summer, or house every night in winter. Too much stock will irrecoverably impoverish any plantation, and be themselves always poor. Just enough stock will furnish droppings and compost manures worth infinitely more than the gleanings of which they have robbed the plantation. Every horse should be made to pay in manure for the fodder and hay he eats during the year; sheep and cattle for the shucks they eat during the winter, and each hog for one-third the corn he eats, after penned for fattening.

And, in the fifth place, if the planter's object be the reclamation of land, nothing should be lost—neither time nor labour; nor must he lack judgment or energy. Indeed, he must possess all the cardinal virtues. Patience must be added to his perseverance, idleness subtracted from his industry, carefulness multiplied by his vigilance, and his expenditures divided by economy.

Respectfully submitted,

D. WYATT AIKEN.

The Edible Bird's Nests.

The birds' nests which are esteemed so great a luxury in China have become an article of consumption in Paris. Although by far the greater portion of what is consumed under that name is nothing more than fish-glue, still the genuine nests can be purchased at about $70 per hundred weight in its crude state. The chemist, M. Paven, received some years ago samples of an East Indian plant, known under the name of China moss. He recognized it as one of the alga of Java, the gelidium corneum. On submitting it to chemical analysis, he obtained clear gelatine, far preferable in that obtained from fish. Comparing it with the Chinese birds' nests he found that the swallows which make these nests must make use of the alga, working over its gelatinous matter as our swallows do in plastering up their nests. This solves a problem of long standing among naturalists, whether the edible birds' nests are of animal or vegetable origin; they are both.

From the British Farmer's Magazine.

The Early English Agricultural Authors.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

In a recent number of this valuable magazine I endeavoured to trace some of the earliest-written laws relating to the agriculture of our country from old British days to the time of Henry VIII. It was in that reign that the first two works on English farming were printed. These were the treatises of Bishop Grotehead (or Greathead) and of Sir Anthony Fitzherbert. To these very curious little works I propose in this paper to direct my readers' attention.

It will be well, however, if we first briefly pause to remember what kind of tenantry—what sized farms were held by the husbandmen to whom those two learned authors addressed themselves. As I have on a previous occasion remarked, when alluding to the early notices of English farming, the native Britons, it is very certain, appropriated but small portions of the land for raising corn, or other cultivated vegetables, and the rest of the country was left entirely open, affording a common pasturage for their cattle, and *pannage* for their swine. Under the Roman government the extent of cultivated ground must have considerably increased; yet the oldest writers agree that by far the greatest proportion of the country was occupied by heaths, woods, and other unreclaimed wastes.

When the Saxons established themselves in the island, an almost total revolution in the proprietorship of the lands must have occurred. The conquest was only accomplished after a bloody struggle; and what was won by the sword was considered to possess an equitable title that the sword alone could disturb. In those days it was supposed that the lands of a country all belonged to the king; and on this principle the Saxon monarchs gave to their followers whatever districts they pleased, as rewards for the assistance afforded in the conquest, reserving to themselves large portions, and imposing certain burdens upon each estate, granted (*Coke's Littleton*, 1, 58, 2; *Blackstone's Comm.*, 45, &c.) This was only a continuance of that feudal system that prevailed upon the continent; and we may take the county of Sussex as an example how the land was carved out among the aristocracy in the days of our Norman kings, reckoning a *hide* at 100 or 150 acres:

	Hides.
The King had	59½
Archbishop of Canterbury	214
Bishop of Chichester	184
Abbot of Westminster	7
Abbot of Fecamp	135
Bishop Osborn	149
Abbot of St. Peter's, Winchester,	33
Church of Battle	60½
Comes of Oro	196¼
Comes Roger	818
William of Braiose	452¼
Abbot of St. Edward	21
Comes Moriton	520
William of Warrene	620¼
Odo and Eldred	10

The great proprietors granted the chief part of their estates to the actual cultivators of the soil, receiving in general from the under-tenants certain proportions of whatever might be the productions of the farms. Thus we find one tenant stating, "I give food to seventy swine in that woody allotment called Wulfeudinleh, and five waggonsfull of good twigs; and every year an oak for building, and others for necessary fires, and sufficient wood for burning." (*Bede, Hist. Append.*, 970.) The rent of ten hides of land were even regulated by two of the laws of King Ina. They enacted that the tenant of such extent of land should render to the lord ten vessels of honey, three hundred loaves, twelve casks of Welsh ale, thirty of clear ale, two old rams, ten wethers, ten geese, twenty hens, ten cheeses, one cask of butter, five salmon, twenty pounds' weight of fodder, and one hundred eels; or else ten mittas of malt, five of grits, ten of wheat flour, eight gammons, sixteen cheeses, two fat cows, and in Lent eight salmon. (*Wilkins, Leges Saxon*, 25, 3; *Gale's Hist. R.*, 410.) Such grants were usually to the tenant and his heirs forever, so long as they afforded the accustomed rent; and I am not aware of any grant or lease extending for a shorter period than the life of the tenant. An example of these occurs in the year 852, when the abbot and monks of Medehamsted let some land at Sempingham to a tenant named Wulfred, for his life, on condition that he annually paid them sixty fother of wood, twelve fother of *græfan* (coals,) six fother of turf, two tons of clear ale, two killed oxen, six hundred loaves, ten casks of Welsh ale, one horse, thirty shillings, and a night's lodging. (*Saxon Chronicle*, 75.)

As this feudal system declined, and was finally extinguished in the twelfth year of

Charles II., so proportionally did the landed interest increase in prosperity. Freed from the burden of furnishing a soldier and his armour for every certain number of acres, and all restrictions as to land changing hands being removed, and the numerous impositions being got rid of, with which the lords oppressed their sub-infeudatories, it soon became a marketable species of property; and, as money and merchandise increased, and the proprietor lived less upon his estate, it soon became the most eligible plan for both landlord and tenant, that the whole rent should be paid in money.

Of the size of these early farms we have no precise information; but from the laws of Ina we may perhaps conclude that a hide of land, equal to about 100 or 120 acres, was the customary size; for, in speaking of the produce to be given to the lord for ten hides, the law speaks of the smallest division of each county of which it was particularly cognizant; namely, of ten families, or a tithing, as they were collectively called. Again, Bede expressly calls a hide of land familia, and says it was sufficient to support a family. It was otherwise called mansum, or manerium, and was considered to be so much as one could cultivate in a year. (*Henry of Huntingdon*, vi. 2,066.)

That in the time of Henry VIII. rents were payable in money, we have the evidence amongst others of Bishop Latimer. He flourished in the early part of the sixteenth century, and his father was amongst the most respectable yeomen of his time, yet his farm probably did not much exceed one hundred acres. He observes in one of his sermons, "My father was a yeoman, and had no lands of his own; he had only a farm of £3 or £4 a-year at the utmost, and hereupon he tilled as much as kept half a dozen men. He had a walk for one hundred sheep, and my mother milked thirty kine."—(*Sermons, p.* 30.)

It is evident, from the constant reference to woods in these husbandry notices, how valuable they must have been in those days for fuel, since pit-coal was not then extensively available. Their value of course increased towards the northern portion of our island, so that we find the Scottish Parliament directing the planting of timber trees. In 1503 (the 6th of James IV. of Scotland) it was ordered "that everith Lord or Laird make them to have Parkes with Deare, Stanks, Cuningares, Doweattes, Orchards, Hedges, and plant at the least ane Aicker of Wood, quhair there is na greate Wooddes nor Forrestes."

Other acts of a similar kind, for the promotion of the growth of timber, had been previously made; and again in 1535.

The clergy and the rural life of those days seem to have had little reverence for God's house or God's acre; for in the same year it was ordered by the Parliament that "nor Faires be halden upon Halie days, nor zit within Kirkes nor Kirkezairdes upon Halie daies nor uther daies."

Such were the primitive habits and modes of cultivation, down to the time of the two old agricultural authors, whose works I now propose to describe.

Sir Anthony Fitzherbert, as I have in another place remarked, (*Quar. Jour. Ag.*, vol. ii., p. 491,) was the youngest son of Ralph Fitzherbert, of Norbury, in Derbyshire. He was educated at Oxford; and when called to the bar by the Honourable Society of Gray's Inn, "his great parts, penetrating judgment, and incomparable diligence," says his biographer, "soon distinguished him in his profession." He was made a serjeant-at-law in 1511, and was knighted five years afterwards. In 1523 he became one of the Justices of the Court of Common Pleas, in which year he published, it is supposed, his "Boke of Husbandrie;" for a copy was possessed by the late Mr. Heber, bearing that date, "imprynted by Rychard Pynson."

Fitzherbert's biographer adds, truly enough, that "he has held the oracle of law in his time." He evidently possessed the most undoubted courage and the most uncompromising integrity. He was one of the very few who dared to oppose Cardinal Wolsey in the height of his power. On his death-bed, at a period when almost all were eagerly scrambling for the spoils of the Church of Rome, he solemnly warned his children on no account to accept of any of the sequestered property of the abbeys.

To this injunction his descendants inflexibly adhered. They have often been honourably distinguished in the ranks of literature and in the public service of their country. The family was ennobled in 1801, when Alleyne Fitzherbert was created Lord St. Helens.

Sir Anthony Fitzherbert died on the 27th of May, 1538, and lies buried in his own parish church of Norbury, where, on his

gravestone of blue marble, was long to be seen the following short and modest inscription :

"Of your charitie, pray for the Soule of Sir Anthony Fitzherbert, Knyght, one of the King's Justices of his Common Bench, and sometime Lo. and patron of this Towne, and Dorothy his Wife, daughter of Sir Henry Willoughby, Knyght, &c., which Sir Anthony deceased 27 May, 1538."

Of his great law works, by which he is so well and so honourably known to the law-student, this is hardly the place to describe. His "Natura Brevium," and his grand "Abridgment of the Laws," the great Sir Edward Coke has well described, when he is speaking, in his preface to his Eighth Report, of the first-named, and of the last says, "it is an exact work, and exquisitely penned." (Preface to Tenth Report.)

In the Library of the British Museum will be found a small duodecimo volume, entitled "The Boke of Husbandry," by Sir Anthony Fitzherbert, published in 1534; and this is certainly the earliest extant work on husbandry, that professes to be *written* by an Englishman.

It commences by saying, "Here begyneth the Boke of Husbandry, and fyrste whereby husbandemen do lyve."

An early section is of "dyvers maner of plowes."

It is evident from this that, even in those days, there were different kinds of ploughs used in various parts of England; for, as our author remarks,

"One plowe will not serve in all places; wherefore it is necessary to have dyvers sortes. In Somersetshire, Dorsetshire, and Gloucestershire, the share beam, that in many places is called the plow head, is four or fyve foote longe, made very broad and thinne; and that is because the land is very toughe, and would suck the plowe into the earth, if the share beams were not very longe, broade, and thinne. In Kent they alter muche in fashyon; for there theye goe upon wheeles, as they do in some parts of Hartfordshire, Sussexe, and Cornewalle. But," adds Fitzherbert, very wisely, "neyther wyll I stand too stryctly on theyr fashyon, sythe theyr is no countye but custome or experience hath instructed them to make choyce of what is avaylable; and he that wyll lyve in any countrye may by free charter learne of hys neighbours, and howsoever any plowe be made or fashyoned, so it be well tempered, it may the better be suffered."

Sir Anthony, like Bishop Greathead, was a decided advocate for the use on heavy soils of oxen in husbandry. He had evidently thought much on the subject. It is curious to see how closely the arguments on the subject by a farmer 340 years since, resembled those of modern agriculturists. At the conclusion of a section devoted to the subject, he remarked: "If any sorance betyde a horse, as old age, bruysyings, blyndness or lameness; then is he worth nothynge except for a kennell of noyse-begettyng hounds, (we might suspect from this remark, that the learned judge was no friend to the delights of the chase.) But if myschief befall an ox, for ten shyllyngs at any tyme he may be fed, and then he is man's meate, and in that degree better than ever he was. These reasons and circumstances considered, I am of the poet's opynyon, that the plowe of oxen is much more profytable than the plowe of horses, to whych the Holy Scryptures condescend; for wheresoever it speaketh of husbandrye, it only sayth the oxe to hys yoke for labour."

After telling the farmers of his time how they should plough different kinds of land "all times of the yeeare," he then proceeds in a natural order of arranging his work, to seed sowing. He commences with a seed, which should be mingled, in fact, with all other kinds, and which he thus describes: "There is a seed called dyseretyon, if a husbandman have of that seed, and myngle it amonge his other corne, they wyll grow doubtless much the better." And he adds: "Thys seede of dyseretyon has a wondrous vyrtue, for the more it is eyther taken of or lent, the more it is."

To Sowe Barley is the title of a section at page 10. It seems that in those days there were "thre manner of barleys, that is to say: spot barleye; longe eare; and bere barley, that some menne call bigge."

"To Sowe Otes" is the next title of a section. Our author says of this crop, "It is to be knowen that there be III. manner of oats, that is to saye: redde otes, black otes, and roughe otes. Redde otes are the best otes, and verye good to make otemele of." Black otes he deemed inferior to the red, and he adds, "the roughe otes be the worst: they be very lighte, and have long

tayles, whereby they wyll hange eche one to other."

He goes on to say, "all these manner of otes weare the grounde very sore, and maketh it to bear quyche."

He leaves the quantity of seed oats to the farmer; "hys wysedome and discretion muste discerne it."

He proceeds to treat of "how to harowe all manner of corne." The ploughing of those days was evidently ill done, and the harrows heavy and rudely constructed. Fitzherbert remarks, "it is a great labour and payne to the oxen to goo to harrowe, for they were better to goo to the plowe two dayes than to harrowe one daye. It is an old sayinge—

> The ox is never woo
> Tyll he to the harrowe goo.

It is because it goeth by twytches and not alway after one draughte."

It seems from what he says in his chapter "howe forkes and rakes should be made, (p. 19,) that the husbandmen of that time made their own."

When he speaks of haymaking, p. 20, he truly enough remarks, "good teddynge is the chief poynte to make good hey."

Of artificial manures, they were evidently in those times not altogether unacquainted, for Fitzherbert in his chapter of "how to make barrayne grounde brynge forth good corne," recommends the mingling of saltpetre, dregs of oil, and pigeons' dung with the seed.

Then he has a chapter on "howe to carrye out manure or dunge, and how to spreade the same." He advised his brother-farmers that it should be "layed up in small heaps neere together;" "to spreede it evenlye;" to leave none where "the greate heepe stoode," and not to let the heaps stand too long, lest if they took a shower of rain the goodness of the manure should "runne into the grounde where the heape standes, and the rest when it is spreade wyll lyttle profyt." He also recommends the use of "marle."

Another of the books into which the work was divided, is devoted to the "breedyng, oderyng, and usage of cattell by the whatsoever els appertaynes to theme, and fyrst of sheepe." In this, when speaking of "what thynges rottethe sheepe," he gives a list of things, such as "the grasse called spear-woorte," and another called "penny-grasse," and also "all manner of grasse that the lande floode runneth over;" all "marrishe grounde and marshe groundes, salt-mashes only excepted." And then he adds, "hunger rotte is the worst rotte that can be."

It is ever noticeable that in all barbarous countries, and even in those approaching towards civilization, to the women is assigned labours for which men are better adapted. It is more especially so in the warmer climates of our globe; but even in northern England, in Fitzherbert's book, we find the following grave assignment of hard duties to a farmer's wife of the time of Henry VIII.—

"It is the wyfe's occupatyon to wynnow all manner of corne, to make malt, to wash and wringe, to make haye, to sheere corne, and, in tyme of needs, to help her husbande to fyll the muckwayne or dunge-cart; to dryve the plowe, to loade corne, &c.; to go or ryde to the market, to sell butter, mylk, cheese, pygges, and all manner of corn," &c.

After describing the sundry duties of the wife in attending the market, our author goes on to remark---

"And also to bye all manner of necessarye thyngs belongynge to householde, and to make a trewe rekenynge and a compte to her husbande what she hath receyed and what she hath payed; and if the husbande go to the market to bye or sell, as they ofte do, he then to shewe his wyfe in lyke manner. For if one of them shoulde use to deceyve the other he deceyveth hymself, and he is not lyke to thryve, and therefore they must be trewe eyther to other. I could, peradventure, shewe the husbandes dyvers poynts that the wyves deceyve them in, and in lyke manner howe husbandes deceyve theyr wyves; but if I shulde do so, I shulde shewe more subtyll poyntes of deceyt than either of them knewe of before, and therefore me semeth beste to holde my peace."

The "Thyrde Boke" of husbandry is upon planting timber trees, of which he was evidently enlightened enough to perceive the private and national advantages. Then there is added to the work sundry domestic matters, which Fitzherbert most probably never intended to appear in a book of husbandry---such as the sections on the use of the cinnamon, cloves, pepper and

other spices—receipts for "a balme," and "an approved receyte for the gowte."

His "Fourthe Booke" is still more of a domestic nature, "contaynyng the orderying of an householde." In this he is particular in his directions how the men-servants should be kept in order and honest, for he had evidently a strong suspicion that in those days they were roguishly inclined. Then he proceeds to give directions for breeding all kinds of poultry—how many eggs should "be sette under your henne," and says the number should "be odde," either a "fyfteene or nynetee," according to the season; and then he has several other little sections on similar subjects, and so rarely makes a mistake in his common-sense observations, that we are the more amused when he tells us very gravely, when speaking of swans, that "when they waxe olde they do declare the tyme of theyr owne death to be neere approachyng by a sweete and lamentable note whych they then syng."

Towards the close of this book, Fitzherbert has sundry chapters full of quotations from the holy fathers regarding pleasing God, almsgiving, prayer, &c. Living however, as he did, in very ticklish Protestant and Popish days, when heresy was treated in a very summary and fierry manner, he thought it well to add—

"I make protestation before God and man that I intende not to wryte anythinge that is or may be contrary to the fayth of Cryste and of Holy Church; but I am redye to revoke my sayinge if anythinge have passed my mouthe for want of lernynge, and to submytte myself to correction, and my boke to reformatyon."

"Go lythell quere, and recommende me
To all that this treatyse shall se, here or rede;
Prayenge them therewith content to be,
And to amende it in places where, as in nede,
Of eloquence they may perceyve I want the sede.
And rethoryke in me doth not abounde,
Wherefore I have sowe such seeds as I foud."

At page 91, Fitzherbert thus concluded his book—

"Thus endeth this rygnt profytable boke of husbandry, compyled sometyme by Mayster Fitzherbarde of charytie and good zele that he bare to the weale of this mooste noble realme, whyche he dydde not in his youthe, but after he had exercysed husbandry with great experyence xl. years.

"Imprynted at London, in Flete-street, in the house of Thomas Berthelet, nere to the condite, at the synge of Lucrece. Cum privielgio."

In the same volume of the British Museum Library is also bound up another work of Fitzherbert's entitled, "Surveyinge, A. D. 1539."

The work of Bishop Grotchede, or Greathead, disputes with the Boke of Fitzherbert the merit of being the first English treatise on agriculture. The claims of both these interesting works have been, on a recent occasion, too fairly and clearly stated by the editors of the "Cottage Gardener" to need any other description ("Cottage Gardener," vol. xxxii., p. 52)

After alluding to the edition of Fitzherbert printed in 1523 by Richard Pynson, they add—

There is as early, if not an earlier, work, however, even than that of Fitzherbert's.—It is entitled as follows:—

"Here begynneth a tratyse of Husbandry which Mayster Groshede, sometyme byshop of Lyncoln, made and translated it out of Frenshe into Englyshe, which techeth all manner of men to govern theyr londes, tenements, and demense, ordinatly as in the chapytres evidently is shewed."

Now, whether or not this "tratyse" was written by "Master Groshede," it is quite certain that it was printed by Wynkn de Worde, who was Pynson's contemporary, their earliest books being printed in the same year, 1493, and they continued rivals and publishing the same books until the date of Wynkyn de Worde's death in 1534. A few instances may be quoted. De Worde published *Mons. Perfectionis* in 1497, and Pynson did so the same year; Pynson published *Dives and Pauper*, in 1493, and De Worde issued it in 1496; De Worde brought out *The Siege of Troy* in 1503, as did Pynson in 1513. That Wynkyn de Worde did print the "tratyse" is proved by the copy, the only one known to exist, in the University Library at Cambridge. It has his monogram, and is, beyond a doubt, from the same sharp, broad-faced old English type, and of the same black, unbroken ink as gave birth to other acknowledged works from his press. It is without a date; but either it was published as a rival to Fitzherbert's "Boke," or this "Boke" was published to oppose Grosseteste's "Tratyse."

It is a small quarto of twelve leaves. On the first page is a woodcut representing a

a steward or other party of authority, who, with hands outstretched in astonishment, is reprehending a woodman, who certainly needed the reproof, for he is cutting off the top of a tree by the blows of an axe, which have made a ruinous gap half-way up the trunk.

As it certain that it was printed by Wynkyn de Worde, so is it equally beyond a doubt that it treats of English husbandry. Groshede may have first "made" it in French, and then "translated it out of Frenshe into Englyshe," but still the truth is apparent that it is written concerning English husbandry, all the measures are English, and so are all the attendant particulars. The best evidences of this that can be placed before our readers are the following extracts :—

The first is what we should now call a "Table of Contents"—

"The i chapytre telleth how ye shall spende your good and extende your londes.

"The ii chapytre telleth how youre londe shall be mesured, and how many perches maketh an acre, and how many acres maketh a yerde of londe, and how many yerdes maketh an hyde of londe, and how many hydes maketh a knyghtes fee.

"The iii chapytre telleth how many acres of londe yt a plough may tele in a yere.

"The iiii chapytre telleth a plough of oxen or a plough of hors may tele more londe in a yere and which is more costly.

"The v chapytre telleth in what season ye shall begynne to falowe all maner of londes.

"The vi chapytre telleth how ye shall lay youre londe at sede tyme.

"The vii chapytre telleth how your londe shall be sowne in all seasons.

"The viii chapytre telleth how ye shall chaunge your sede and nourysshe your stubble.

"The ix chapytre telleth how ye shall nourysshe your dounge and wede your corne, and how it shall be mesured out of the barne, and how moche an acre shall yelde agayn more than your sede yt ye sholde have wynnynge therby.

"The. x chapytre telleth how ye shall chaunge all maner of catell in season.

"The xi chapytre telleth how ye shall change youre werke bestes and wene youre calves, and what prouffyte ye shall have of your kyne, and vayll to butter and chese.

"The xii chapytre telleth how ye sholde nourysshe youre swyne and your pygges.

"The xiii chapytre telleth howe ye shall nourysshe your shepe and dyvers medycynes for theym

"The xiiii chapytre telleth what profytes ye shal have of youre ghees and hennes.

"The xv. chapytre telleth how ye shall by and selle and preve youre weyghtes.

"The xvi chapytre telleth how ye shall take a compte of youre balyf ones a yere."

Of these "Chapytres" I will republish four :—

"The ii chapytre.

"It is to wete that thre barly cornes take oute of ye myddes of the eer maketh an ynche, and xii ynches maketh a fote. And xvi fote and an halfe maketh a perche, and xi perches in length and iiii in brede maketh an acre of londe, and iiii (acres) maketh a yerde of londe, and v yerds maketh an hyde of londe, and vii hydes maketh a knyghtes fee.

"The iii chapytre.

"Some men say yt a plough may not tele viii score or ix score acres of londe a yere. But I shall prove it by good reason yt a plough may do it. For ye shall understonde than an acre of londe is in mesure xl perches in lengthe and iiii in brede, and the mesure of a perche is xvi fote and an halfe. And so ye brede of an acre of londe is xlvi fote, and so ye go with youre plough xxxiii tymes up and doune the londe and see the fyrst forowe be a fote and eche of the other be in lyke qantyte and then is an acre ered. And whan the forowe is as strayte as it may be than is it xxxvi tymes up and doune the londe though it be a large acre. And the plough be never so feble attemost ye have gone but lxxii tymes up and doune ye londe, which is but v myle way. Now truly the hors or oxe is feble that from the morowe maye not go softely iii myle from home and come agayn by none. And by this other reason ye undstonde that there be lii wekes in the yere, take viii weeks for holy days and other lettynges and there remaneth behynde xliiii to werke in the se xliiii wekes ben cclx days besyde Sondayes. Also a plough shall ere thryes in the yere | yt is to say in the wynter, in lenten, and in leke sede time.— In wynter a plough shall ere iii rodes and a halfe a daye. And on eche other season an acre on the day at the lest. Now knowe ye whether it maye be done or not, but by cause ploughmen carters and other layne and werke not truly. It is behovefull yt men fynde a

remedy against their servanntes. And therefore it is necessary that the balyf or some of the lordes offycers be with them the fyrste daye of doynge folowynge and sowynge to se yf they do theyr werkes truly, & let theym answer you as moch werke as they dyde the fyrste day. Also it is necessarye that youre balyf overse youre werkemen ones in a daye to wete yf they do theyr werke truly as they ought to do, and yf ye fynde theym contrary he shall chastyse theym reasonable therefore, and by dysereyon, &c.

"The iiii chapytre.

"The plough of oxen is better than the plough of hors, but yf it be upon stony grounde yt whiche greveth sore the oxen in theyr fete. And yt plough of hors is more cosily than ye plough of oxen & yet shal your plough of oxen doo as much werke in a yere as youre plough of horse, though ye dryve your hors faster than ye do your oxen, yet in what grounde so ever it be yyure plough of oxen, yf ye tele your londe wel and evenly, they shal do as moche werke one daye with a nother as your plough of hors, yf the grounde be tough your oxen shall werke where youre hors shall stande styll. And yf ye will knowe how moche the one is costlyer than ye other I shall teche you. It is a costume yt bestes yt go to the plough shall werke from ye feste of Saynt Luke unto the feste of Saynt Elen in Maye, that is to saye xxv weekes, and yf youre hors sholde be kepte in a good plyght to werke he must haue dayly the syxt parte of a bushel of otes pryce ob. [*obolus*, a farthing] and in gresse in somer season xii d. And every weke that he standeth at drye mete one with another ob. in strawe for lytter. And in shoyge as often as he is shodde on all foure fete iiii d. at the lest. The somme of his expense in the yere is ix s. vi d. ob., besyde hay and chafe and other thynges. And as for the oxe ye may kepe him in good plyght dayly to doo his journey gyuynge hym euery weke thre oten sheves pryce i d. by ause x oten sheves yelde a bushell of otes yf they be made by the extent and in somer season xii d. in gresse. The somme of his expenses by the yere is iii s. i d. be syde strawe and chafe. And yf a hors be overset and brought downe with labour it is adventure & ever he recover it. And yf your ox be oversette and brought downe with labour ye shall for xii d. in somer season have hym so pastured that he shal be strong ynough to do your werke or elles he shall be so fatte that he may selle him for as moche moneye as he coste you.

"The xiiii chapytre.

"Ghees and hennes shall be at the delyueraunce of youre baylyf or lete so ferme a goos for xii d. in a yere Fyne hennes and a cocke for iii s. in a yere and there be some baylyfs and deyes that say nay to this prouffytes. But I shall preuve it by reason, for in halfe a yere be xxvi wekes, and in these xxvi wekes ix score dayes, and in eche of these dayes ye shall have an egge of eche henne & yt is ix score egges of eche henne in that half yere, it is a feble sale of egges & xxx egges be not worth a peny and yf ony of theym syt in that halfe a yere or some daye in defaute of lyenge, ye shall be recompensed there fore, and of vi more to bere out the ferme ye cocke, and wt the sale of the chekens yt youre syttynge hennes bryuge forthe in that other halfe yere. Nowe shall ye se whether I say sothe or nay the pecocke shall answere as moche the for feders (feathers) as the shepe for his wolle. Every cowe shall answere you a calfe. And every moder shepe shall answere you a lambe. Every female swyne shall answere you xiii pygges at thrye farowyges at two tymes at eche tyme iii and the thyrde tyme fyve the x for tythe. Every henne shall answere you of ix soore egges or of chekens to ye value. Every goos shall answere yon of vi ghoslyngs And yf ony of this catell be baryene ye baylyf shall answere yon of the yssue that is lost thrugh his euyll kepynge, by cause that he dyde not selle theym and put the sylver to other prouffytes to the value."

The last three or four pages are devoted to Gardening, and this portion has this commencement:—

"Here begyneth the plantynge of trees and of vynes."

It is quite unworthy of the previous part, being a mere collection of the mis-statements of the Greek and Roman writers relative to altering the colour of fruits and similar indulgencies of the imagination.

It has been doubted whether Bishop Grosseteste wrote all the works of which a list is given in his life by Pegge, as well as in Tanner's *Bibliotheca Monastica*. It has been truly said that they are equal in number to those produced by any of the great Arabian Philosophers. Indeed, in one department of

literature—Poetry, he surpassed them, for we have his "Chastel d'Amour" among the Harleian MSS. But, the works enumerated, and mostly remaining in MS., are generally very brief, and do not exceed, even if they equal, in number of pages, the varied works published by Fitzherbert, who, also, found time, notwithstanding his profession, to write his "Boke of Husbandry."

Let us remark, also, that this is not the only work of Grossesteste that was thought worthy of being printed so many years after his decease, for his *Treatise de Artibus Liberalibus* and his *Commentary on Aristotle* were published at Venice in 1514.

Bishop Robert Greathead, for he was an Englishman, and his real name was only foreigned by such translations as "Grosthead" and "Grosseteste," was a man of high attainments, and of a mind enlarged far above the generality of his contemporaries. He was a friend of Roger Bacon, and studied as he did the Natural Sciences. He was, says Sharon Turner, "intrepid and patriotic, foremost in every useful pursuit of his day, the friend and cultivator of poetry, scholastic philosophy, Arabian science, natural philosophy, mathematics, divinity, and canon and civil law. He was also the fearless and successful assertor of the liberties of the English Church, and a protector of the English clergy against the taxation and tyranny of the Pope."—*Turner's Hist. of Middle Ages.*)

His letter to Pope Innocent in 1253 may be read in the Chronicle of Matthew Paris, and was so displeasing to the Pontiff, that he threatened to hurl upon him confusion and destruction. Greathead went fearlessly on to declare the Pope both a heretic and antichrist; and after death the Bishop was believed to have visited the Pope, and to have threatened and terrified him from his purpose of having the Bishop's bones dug up and thrown out of the church. The diffusion of such an idle tale implies the popularity of Bishop Greathead, and the preceding facts readily explain why the applications to Rome for canonizing him were but coldly received.---(*Wilkins' Concilia*, ii., 287.)

There is no sound reason, then, for doubting that Bishop Greathead wrote the "Tratyse of Husbandry;" and if he did, it is certainly the earliest relation we have of English Agriculture in the 13th century, for he died in 1253, at Buckden, the episcopal residence of his see, and the agriculture he describes was that of the reigns of Henry II., Richard I., John and Henry III.

It is refreshing to review works like these. They came forth as soon as printing was introduced into our island; plainly written little books for the small farmers of their time. Printing, indeed, when it first showered its blessings over other classes, did not neglect the agriculturists. It has since been the handmaid of all the sciences, all the knowledge which have gradually raised the British farmer to his present proud position.---Printing---and printing only---enabled Fitzherberd and Grotthead to so well address their brother-cultivators of 1532. They were well followed by Tusser in the same century, Old Worlidge and others in the seventeenth; and Jethro Tull (the greatest benefactor to his country of them all) in 1732, exactly two centuries after the publication of the first English "Boke of Husbandrie."

From the British Farmer's Magazine.

On the Production of the Sexes Among Sheep.

[TRANSLATED FROM THE FRENCH OF THE "JOURNAL D'AGRICULTURE PRATIQUE."

The interesting researches of Giron de Bazareingues into generation, and particularly on the production of the sexes amongst domestic animals, are now known but by very few persons, having the misfortune to be of too remote a date. On the other hand, meeting with a very varied reception on their appearance, they have had the fate of all contested things—they have left in the mind nothing but ideas undecided as to their value. Zooteehny, in fact, was too little advanced at that period, for the art of animal-production to think of extracting from such a study facts for its use.

Daily observations, conducted and arranged with the calculation in hand, in a sheepfold of great importance—that of the Dishley-Mauchamp merinos of M. J. M. Viallet, at Blanc, in the commune of Gailhac-Toulza (Haute-Garonne)—have enabled me to comprehend the laws which, according to M. Giron de Bazareingues, preside over the production of the sexes. If I am not deceived, I have gained some new hints; but, however this may be, the reader will see in the following notes only an exposition of facts, designed simply to draw attention once more to this curious question. And,

as the establishment of any natural law whatever has at all times its utility even in practice, it is perhaps desirable still to find it of importance in the economic management of animals in certain positions.

The general law which Giron de Bazareingues has recognized on the subject of the procreation of the sexes is as follows: The sex of the product would depend on the greater or less relative vigour of the individuals coupled. In many experiments purposely made, he has obtained from the ewes more males than females, by coupling very strong rams with ewes either too young or too aged, or badly fed; and more females than males, by an inverse action in the choice of the ewes and rams he put together.

This law has developed itself regularly enough at the sheepfold of Blanc, in all cases in which circumstance of different vigour between the rams and ewes have been observed in coupling them. Witness two striking examples of it:

In 1853, births, the issue of young ewes by a Dishley-Mauchamp merino ram, extremely vigorous and highly fed, produced 25 males, and 9 females only, or 71.73 per cent. of males, and 28.27 per cent. of females.

At a later period, the same ram, still in full vigour, having been put to some ewes that had done nursing their lambs—a period at which the ewe is found very weak—there resulted, in 1853, 8 male births against 4 females; and in 1854, under similar circumstances, 17 male against 9 female births. The two occasions united yielded 65.78 per cent. of males, and 34.22 per cent. of females.

But the following fact has nothing in common with those related by Giron de Bazareingues, and which has been repeated, with small variation, every year, from 1853—the period at which the observations I have noted down began.

This fact consists:

1st. In that, at the commencement of the rutting season, when the ram is in his full vigour, he procreated more males than females.

2nd. When, some days after, the ewes coming in heat and in great numbers at once, the ram was weakened by a more frequent renewal of the exertion, the procreation of females took the lead.

3rd. The period of excessive exertion having passed, and the number of ewes in heat being diminished, the ram also found less weakened, the procreation of males in majority again commenced.

In order to show that the cause of such a result is isolated from all other influences, of a nature to be confounded with it, I shall take the year 1855–6, in which, by the effect of a degree of equilibrium of age and vigour between the rams and ewes, the male and female births were found, relatively with each other, nearly upon a par in numbers, being 25 males to 23 females.

The following table, drawn up with the dates of birth, exhibits the facts in detail. The letter M. indicates the male, and F. the female births.

It will be seen that, the list of births having been divided into three successive series, and in mean proportions almost equal, we have for the first, of eleven days, from the 27th December to the 8th January, 13 males against 4 females; for the second, of nine days, from the 9th to the 18th January, 3 males only against 15 females; and for the third, of eleven days, from 19th to 29th January inclusive, 9 males against 4 females.

Table of the Dishley-Mauchamp Merino Lambing, at the Sheepfold of Blanc, in December and January, 1855–56.

FIRST SERIES.

Dec.	27 ..	M.	Jan.	4 ..	M.	Jan.	6 ..	M.
	30 ..	M.		4 ..	M.		7 ..	F.
	31 ..	M.		4 ..	M.		8 ..	M.
Jan.	3 ..	M.		5 ..	M.		8 ..	M.
	3 ..	F.		5 ..	M.		8 ..	F.
	3 .	F.		6 ..	M.			

Males, 76.8 per cent.; females, 23.9 per cent.

SECOND SERIES.

Jan.	9 ..	F.	Jan.	13 ..	F.	Jan.	16 ..	F.
	9 ..	F.		15 ..	F.		16 ..	F.
	11 ..	M.		15 ..	F.		16 ..	F.
	12 ..	F.		15 ..	M.		17 ..	F.
	12 ..	F.		16 ..	F.		18 ..	M.
	13 ..	F.		16 ..	F.		18 ..	F.

Males, 16.66 per cent.; females, 83.34 per cent.

THIRD SERIES.

Jan.	19 ..	M.	Jan.	20 ..	M.	Jan.	24 ..	M.
	19 ..	M.		20 ..	F.		24 ..	M.
	19 ..	F.		22 ..	F.		29 ..	M.
	19 ..	F.		22 ..	M.			
	20 ..	M.		23 ..	M.			

Males, 69.23 per cent.; females, 30.77 per cent.

At the end of each month, all the animals of the Blanc sheepfold are weighed separately; and, thanks to these monthly weighings, we have drawn up several tables, from which are seen the diminution or in-

crease in weight of the different animals, classed in various points of view, whether according to age, sex, or the object for which they were intended.

Two of these tables have been appropriated to bearing ewes—one to those which have borne and nursed males, and the other to those that have borne and brought up females. The abstract results of these two tables have furnished two remarkable facts.

1st. The ewes that have produced the female lambs are, on an average, of a weight superior to those that produce the males; and they evidently lose more in weight than these last, during the suckling period.

2nd. The ewes that produce males weigh less, and do not lose, in nursing, so much as the others.

If the indications given by these facts come to be confirmed by experiments sufficiently repeated, two new laws will be placed by the side of that which Giron de Bazareingues has determined by his observations and experiments.

On the one hand, as, at liberty or in the savage state, it is a general rule that the predominance in acts of generation belongs to the strongest males, to the exclusion of the weak, and as such a predominance is favourable to the procreation of the male sex, it would follow that the number of males would tend to surpass incessantly that of the females, amongst whom no want of energy or power would turn aside from generation; and the species would find in it a fatal obstacle to its reproduction. But, on the other hand, if it was true that the strongest females, and the best nurses amongst them, produce females rather than males, Nature would thus oppose a contrary law, which would establish the equilibrium, and, by an admirable harmony, would secure the perfection and preservation of the species, by confiding the reproduction of either sex to the most perfect type of each respectively.

Martegoute,
Former Professor of Rural Economy.

To Dye an Orange Color.—Boil the skins of ripe onions half an hour; take out the skins, and add one ounce of alum to one quart of dye; put in the silks, stir often for half an hour; dry, wash and iron quite damp.

The most delicate, the most sensible of all pleasures, consist in promoting the pleasures of all others.

Tobacco.

There are two plants, the produce chiefly of the Southern States, the value of which, as commodities of export, equal all the other exports of the country put together, —viz., cotton and tobacco.

Tobacco is indigenous to the soil of America, and has always shown a preference for the States of Virginia and Maryland. The tobacco plant is one of those sources of national wealth which Nature has assured to us by a peculiar adaptation of soil and climate for its production, and which no other country, excepting perhaps the Island of Cuba, possesses in an equal degree. The tobacco plantations may be certainly calculated upon as yielding from thirty-five to forty millions of dollars annually. For the last forty years, the crop has shown a steady increase:—it is, however, chiefly during late years that the production has most largely extended. In 1821, the value of tobacco exported was $5,648,962, and for fifteen years the amount taken for foreign consumption continued to average about that value. In 1836, the export reached $10,058,640, and in 1841, $12,576,703, from which point it fluctuated down to about four and a half millions of dollars, until in 1846 the shipments amounted to $8,478,270.

The following table will show the annual export from that period up to the present date.:

Annual Exports of Tobacco from the United States, from the year 1847 to 1859.

Year—	Value.
1847	$7,242,086
1848	7,551,122
1849	5,804,207
1850	9,951,023
1851	9,219,251
1852	10,031,283
1853	11,319,319
1854	10,016,046
1855	14,712,468
1856	12,221.843
1857	20.662,772
1858	17,009,767
1859	21,074,038

The exports for the year 1859 were the largest of any period in the history of the trade. The amount shipped in 1857 was nearly equal, being less by only $412,266; but from reference to the table it will be seen that that was quite an extraordinary year. The average export for the twelve

years ending with 1858 is about eleven and a quarter millions of dollars, which it will be observed is nearly doubled by the amount of last year. Nearly three-fourths of last year's export was taken by England, France, Bremen, and Holland.

The amounts taken respectively by those countries is as follows:

Exported to England	$5,202,810
" France	4,302,170
" Bremen	3,985,178
" Holland	1,942,527

The remaining one-fourth has been exported to the several ports of the world in amounts varying from $30 to the Central Republic, to $940,448 to Belgium.

It is remarkable how universal is the demand for this product. The official returns show a list of one hundred and twenty-five different articles of export; and out of that number, with the exception of grain, there is not one that is shipped to so many different countries as tobacco. The Government report enumerates seventy-one different foreign markets to which our products are exported; and out of that number there are only six that do not buy our tobacco, viz: Madeira, the air of which is possibly too pure to be polluted by the fumes of the weed, Egypt, San Domingo, Greece, Bolivia and Equador;—most of which places produce their own.

The value of the tobacco exported from the United States last year was nearly five times that of our sea products, fifty per cent. more than the products of the forest, not quite three millions of dollars less than the whole export of vegetable food, and rather over an eighth of the value of the cotton crop.

It is clear that the general taste for tobacco smoking is steadily increasing, whether to the public injury or otherwise we leave for those better skilled in the doctrines of narcotics than ourselves to decide. The fact is, that despite of King James' counterblast, and Urban's excommunication, and the ever-issuing anti-narcotic fulminations of our modern physicians,—the people are most resolvedly intent upon having the weed; and this being the case, our tobacco planters will continue to grow it and prosper.—*U. S. Economist.*

Affluence might give us respect in the eyes of the vulgar, but will not recommend us to the wise and good.

Dark Stables.

It cannot be doubted that *light* exercises a very important influence upon animal as well as upon vegetable economy. Every one's feelings bear witness to the stimulus afforded by its agency; a dark day or a dark room induces lassitude and repose, which is quickly dissipated by the bright sunshine. Many diseases are much more virulent in shaded situations; and the eye especially cannot long retain its full power if deprived of light. From mistaken notions on this subject, or from false economy, it is a general practice to exclude light from the stables of horses and other animals. It is supposed by many that they thrive best in the dark. Where the animal is stabled for a brief period of rest, darkness will undoubtedly favor his repose. In the season when flies are troublesome it also may be well to darken the stable to exclude them, but when animals are stabled permanently in darkness, they cannot but suffer in various ways. The horse, especially, is very much subject to diseases of the eye, and there can be but little doubt that this tendency is increased by confining him permanently where the eye, in waking hours, is strained to an unnatural position to perceive objects around him. Horse *jockeys* find an advantage in the use of such stables. The animal being brought into the glare of day is confused and startled, and by his high stepping and half uncertain manner, impresses a novice with an idea of his spirit and action. Even if the quiet induced by darkness may favor increase of fat, it is not conducive to muscular strength. Muscles deprived of the stimulus of light become flaccid, and the apparently high condition induced by this means is soon lost by active exertion. Men, whose employments confine them to poorly lighted apartments soon lose the color and the energy of full health, and the same results follow similar treatment of animals.

Besides this, a dark stable will seldom be kept in that cleanly condition which favors full health. The "corners" will be neglected, especially if the care of animals be entrusted to the "help" who are usually content if the stable looks nice. When building stables, ample provision for light will cost but little more than imperfect fixtures, and in the end will be found more profitable.

Maine Far.

Breadstuffs.

The table following shows the quantity of breadstuffs exported from the variour ports of the United States, to Great Britain and the continent, from Sept. 1st up to the present date for the year 1859–60, and three preceding years:

Exports of Breadstuffs from the United States to Great Britain, Ireland, and the Continent, from Sept. 1 to date, for the years following:

Year—	Flour, bbls.	Meal, bbls.	Wheat, bush.	Corn, bush.	Rye. bush.
1856–7.....	963,460	184	9,164,663	3,243,738	157,254
1857–8.....	846,951	123	3,505,328	1,344,867	..
1858–9.	124,074	20	498,498	331,039	..
1859–60.....	236,228	..	517,360	29,546	..

From this statement, it is apparent that the aggregate export of breadstuffs for the current year is somewhat below that of last. Under the head of flour, there is an increase of 111,254 barrels, and the export of wheat shows an excess of 18,862 bushels; but the decrease on corn is 301,493 bushels. As compared with the years 1856–7, and 1857–8, the falling off is immense. In 1856–7, the quantity of flour shipped was more than that of the present year by 727,232 barrels; of wheat 8,647,303 bushels; and of corn, 3,214,192 bushels. The decrease of this year, as compared with 1857–8, is on flour, 610,723 barrels; on wheat, 2,988,968 bushels; and on corn, 1,315,321 bushels.

The cause for this remarkable decline in grain and flour exports is attributable to the absence of an active demand from abroad. The British market has been supplied with a fair home crop, and its deficiencies have been made up to a large extent by imports from European countries, thus leaving our own produce to the chances of speculative shipment, which, depressed as our great grain-growing section has been, have not been sufficient to induce any extensive consignments. The yield of the last crop was but little under an average, and there must, therefore, be a considerable proportion of the season's produce still in the hands of the farmers and the grain merchants, waiting for more favourable chances of export have been disappointed, and those who based thereon an expectation of a revival of the Western trade this Spring have found their calculations mistaken. Whilst the action of the grain-holders in keeping their produce out of the market has tended to check the immediate recovery of the West, it yet shows favourably, that they should be able to hold their stock, instead of forcing it upon the market at depreciating prices. It is to be remembered, however, in comparing the movements of the present year with those of 1856–7 and 1857–8, that those years were quite exceptional in the history of the trade, the exports being for the former $55,624,832, and for the latter $33,698,490. The lower aggregate value of 1857–8 was caused not so much by the export of a less quantity of produce, as by the lower prices ruling during that period; the average price of wheat flour during 1856–7 was $6 23, whilst during 1857–8 it was only $4 73—a decrease on the former year of about 33 per cent. Making, however, all allowance for this circumstance, there is every prospect that the export of breadstuffs for the current year will fall below an average, and that at the close of the grain year there will be a large amount of produce in the hands of Western dealers.

U. S. Economist.

Iron Manufacture of the United States.

From a statistical summary given by Mr. J. P. Lesley, in his "Iron Manufacturer's Guide to the Furnace, Forges and Rolling-Mills of the United States," we derive the following information respecting the iron manufacture in the United States:

"The entire production of raw material in the United States in 1856, was a little over eight hundred thousand tons (812,917,) being an increase of twelve per cent. from 1854. For the year 1856 the whole iron production advanced only six per cent. over the previous year, but the anthracite branch of the manufacture reached the aggregate of 394,509 tons, being very nearly

one-half the whole iron product of the country, and showing an increase of thirteen per cent. over the previous year, a fact to be explained by the conversion of charcoal furnaces into anthracite furnaces. The industry naturally tends to concentrate itself about the geological centre of fuel in Pennsylvania, a fact shown by the decline of this branch of the iron industry outside of Pennsylvania by an annual rate of over six per cent., which raises the Pennsylvania anthracite increase to over twenty-two per cent.

"The grand total of iron of all kinds, domestic and foreign, used in the United States in 1856, is set down at 1,330,548 tons, which is distributed thus:

	Domestic.	Foreign.	Total.
Rolled and hammered,	519,081	298,275	817,356
Pig Iron,	337,154	55,403	392,557
	856,235	353,678	1,209,913

"Which results give seventy per cent. domestic to 30 per cent. foreign iron. The great facts demonstrated by the statistics collected by the American Iron Association are, that we have nearly 1200 efficient iron works in the United States, producing annually about 850,000 tons of iron, the value of which, in an ordinary year is fifty millions of dollars, of which the large sum of $35,000,000 is expended for labour alone.

"Mr. Whiting, in his *Metalic Wealth of the United States*, estimates the iron product of the world at 5,817,000 tons, of which 1,000,000 are set down for the United States, Great Britain producing that year 3,000,000 When we remember that, so late as 1845, the total product of the United States in iron had not reached half a million tons (486,000,) and that in 1850 it was only 600,000 tons, it will be seen that the progress in this important industry, in the first six years of this decade, has been at the rate of over twenty per centum per annum. The operation of this law of increase will soon, it would seem, put an end to all importation of iron, and points even to an export of this great staple at no distant day. The stock and varieties of iron-ores and coal in the United States is such as seems adequate to meet the demands of the world, as fast as the laws of commerce will permit their development.

Year Book of Science and Art for 1860.

From the American Stock Journal.

Why it is Important to Feed Fattening Animals Regularly.

In all cases of fattening animals it should be the aim of the feeder to have his animals kept, and fed, in such a manner as is most conducive to the object to be obtained; and it would be most desirable to know what kind of food, and feeding, will promote the formation of fat and muscle. M. Florins has given more light than any other man on the subject of the physiological construction of the several animals; and has, by his many experiments, shown the chemical changes which the food undergoes after it is deposited in the stomach. Among the many experiments tried, he has given the result of his researches. He says "stall-fed animals must be *regularly fed* in order that they may eat and repose for digestion. If you feed irregular, it has a great effect upon the *increase* of the animal. If we disturb fattening animals, it creates a waste which has to be made up by the food."

We all know that if we go without our regular meals, there is an exhaustion of the vital powers. All food, after being taken into the stomach, is assimilated by the animal frame, and it is necessary to repose in order that a *chemical action* may be set up in the stomach. If an animal is fed regularly, the digestion will be regular, and the animal frame will soon form habits that will require food at the stated times; the cravings of an empty stomach will require it; a great uneasiness is felt until the food is provided, and, during this irregularity there is *constant waste* of what has accumulated, after supplying the natural waste of the body, as all excess of blood produced is converted into cellular and muscular tissues, which causes the animal to lay on fat and flesh. All the food we feed our stock with, contains a greater or less proportion of chemical substances, and the *oil* is the predominating one that forms the *fat* of all animals. Graziers well know the great waste in getting their fat animals to market, with all the care used, and that the loss is from 15 to 20 per cent. This is ascertained by weighing at home, and after they arrive at market.

Why this great loss? It is the want of the *regular feed, and the constantly disturbing of the animal, which causes a waste of the fat and muscle.* I will here state what Prof. Yoemans says: "Every animal is busy

in drawing in and throwing out air—an unceasing tidal ebb and flow. The oxygen of the air passes through the membrane of the lungs, is taken up by the blood, and is carried to all parts of the body. It does here what it does everywhere—it burns. Slow combustion goes on in the body, and carbonic acid and water are produced. This combustion is necessary to keep up heat, and the oxygen of the air must have carbon and hydrogen in the form of *food and drink* to feed upon. Cut off the animal from all food and drink, and the oxygen at every breath will eat away a portion of his frame. The most combustible parts are first consumed; he grows more emaciated every hour. First, the fat disappears, then the muscles are assailed; and lastly the devouring giant, *oxygen*, attacks the brain and nerves, and death closes the scene. Men say he has starved to death, but the scientific truth is, he has been *burnt to cinders*."

O.

Efficacy of Salt applied to the Tobacco Crop.

As many inquiries have been made respecting the efficacy of salt as a preventive of the formidable disease, called "Black Fire or Rot in Tobacco," and as we have been particularly requested to do so, we reproduce the following article, which appeared in the May number, for 1858, of the Southern Planter, on that interesting subject. The article was communicated by Dr. Spraggins, of Charlotte—though bearing the modest signature, "A."—and, as will be seen, contained reference to the experience of several of his neighbours, confirmatory of the truth of his theory. Besides these it has been further corroborated by the successful use of the remedy by Wm. M. Watkins, Esq., of Charlotte, (from whom we hope to hear further on the subject in reply to inquiries addressed to him through this paper,) by Dr. R. H. Nelson, of Hanover, and others, among whom we may mention R. W. N. Noland, Esq., of Albemarle, who has been reported to us as having attained most satisfactory results from his experiments in the use of salt on his Tobacco crop. We hope he will favour us with a communication detailing his practice and experience, and the result of his experiments.—[EDITOR.

SALT AS A PREVENTIVE OF BLACK FIRE, OR ROT, IN TOBACCO.

Mr. Editor—Doubtless most, if not all, who have cultivated tobacco, have observed, formed on the stems of the leaf, a salt, closely resembling saltpetre, and generally so called. From frequent observation the writer came to the conclusion that the ripest and richest leaves were most disposed to throw out this salt—conceiving this idea, he sought to ascertain its truth as far as practicable, by inquiring of experienced planters. The result has been a full conviction of its truth. This, again, suggested the idea that the elimination of the salt might be immediately connected with the maturation of the plant, and that, as a consequence, whatever would furnish material for the formation of this salt, would encourage the ripening and enrich the plant. Farther investigation led to the conception, that the black fire, or rot, the disease so often disappointing the sanguine expectations of the planter, was the result of the condition of the plant directly antagonistic to maturation, and if so, that whatever would encourage and hasten the process of ripening, would prevent the disease. Inquiries as to the truth of this supposition have confirmed the hypothesis and fixed the conclusion, that a want of the material to form this salt constitutes the cause of the disease, and that furnishing the material or elements, would be a safeguard against its ravages. Since arriving at this conclusion, and before he had made experiments to test the truth of the theory, by the suggestion of a friend, he was induced to use ground alum salt, with Peruvian guano, as a preparation for tobacco, merely to cheapen the manure, two parts of the guano with one of the salt being regarded as equal to all guano as a fertilizer, which he has found to be true. Since using this mixture he has found that he has had no black fire. The last season, which was very favourable to produce this disease, he saw but one or two plants fired in his whole crop. This led to inquiries of his neighboring planters, which resulted as follows:

Mr. M., crop 150,000—land peculiarly liable to fire—whole crop salted except about 30,000 new land—no fire on the old land to attract notice—part of the new fired badly. Mr. C., crop about 250,000—land much less liable to fire than Mr. M.'s—used

no salt—fired very badly, and forced to cut prematurely to save from fire. Col. G., about 200,000—no salt—fired badly. Capt. B., about 200,000—no salt—last cutting began to fire rapidly. Mr. H., about 250,000—200,000 salted—no fire—45,000—guano without salt—fired considerably—5,000 new land—no manure—fired very badly. Mr. B., the friend at whose suggestion the writer was first induced to use salt, says he had not thought of its being a preventive of the fire, but upon reflection recollects that whereas he occasionally had the fire before using the salt, he has had none since. In view of these facts, the writer regards the conclusion legitimate, that ground alum salt is a preventive against the black fire, or rot.

Perhaps the maximum to the acre should not exceed a bushel. This seems to be the opinion of most who have used it, fearing that a more liberal dose may render it more difficult to secure a good stand. Without question it may be advantageously applied during the cultivation, alone or mixed with guano or the phosphates, and possibly with even better effect. A.

Cub Creek, Charlotte.

For the Southern Planter.

Ashes and Wood's Mould.

KING WILLIAM, Feb. 22nd, 1860.

Last April, 1859, I commenced cutting up and piling all the old trees in my woods, and during wet seasons, burning them into ashes for agricultural purposes. Timber getters from Maine had been at work on my land, leaving large quantities of white and red oak to rot, (mostly in ravines and gullies, inaccessible to hauling with ordinary team,) all this was piled up long enough to dry, then burnt, and the ashes raked up with the wood's mould convenient. Hundreds of loads of rich compost have thus been made, with but little expense, and ashes so much needed by our lands and so hard to get, freely supplied. I think there is wood enough rotting in our forests to furnish ashes for agricultural purposes generally, and I hope many may be induced to search out and use it.

Ashes from brush burnt in "new ground," may be hauled to the compost heap with profit, and when mixed with wood's mould and plaster, and sifted, are worth more than guano to *drill* in with wheat.

MATTAPONI.

P. S.—Some of this compost was carted out last fall, and spread on wheat land after seeding; and to-day, February 21st, I am carting and spreading on wheat; some was used on clover intended for next fall's fallow, and a large quantity mixed with all the available manure on the premises, will be used on the present year's corn crop. I am now making a compost of saw-dust and this ash compost, for Irish potatoes—(a root by the way far preferable to turnips as a feed for hogs and cattle.)

Manure---An Agricultural Problem.

I have met several trains of wagons every morning, on my way to my office, filled with fresh stable manure. This morning I stopped an intelligent negro driver, and made some inquiries as to where he intended carrying his load, and the use he intended to put it to. His answer was, that it was intended as manure for a garden, and for corn—it was intended to enrich poor soil upon which to produce a crop the coming season.

Just at the point where I happened to stop, the street was remarkably muddy, with a black stiff loam produced by decomposition of vegetable matter and offal from factories, kitchens, etc.

"Why don't you haul this mud out of the street, and mix with your stable manure?"

"I don't know, sir."

"Don't your master know that this very mud is much better for his purpose than what you are hauling?" The negro's reply was pertinent:

"I don't spec he does!"

And so I believe: very few indeed do know the fact that our common street mud, such as you find in front of your office, is better manure for immediate use than any now used. It contains more of fixed alkali, nitrogen and ammonia, than the best stable litter, the latter containing a large quantity of free ammonia, which dissipates upon exposure to the air, while in the former it is fixed in the form of salts, and enters at once into the general composition of the soil with which it is mixed.

I give this suggestion in hope it may elicit further inquiry and free discussion.

P. B. E.

The Contented Farmer.

Once upon a time, Frederick, King of Prussia, surnamed "Old Fritz," took a ride, and espied an old farmer plowing his acre by the way side, cheerily singing his melody.

"You must be well off, old man," said the king. "Does this acre belong to you, on which you so industriously labor?"

"No, sir," replied the farmer, who knew not that it was the king.

"I am not so rich as that, I plow for wages."

"How much do you get a day?" asked the king farther.

"Eight groschen," (about twenty cents) said the farmer.

"That is not much," replied the king; can you get along with this?"

"Get along and have something left."

"How is that?"

The farmer smiled and said----"Well, if I must tell you; two groschen for myself and wife; and with two I pay my old debts; two I lend away, and two I give away for the Lord's sake."

"This is a mystery which I cannot solve," replied the king.

"Then I will solve it for you," said the farmer.

"I have two old parents at home, who kept me when I was weak and needed help, and now that they are weak and need help I keep them. This is my debt, towards which I pay two groschen a day. The third pair of groschen, which I lend away, I spend for my children, that they may learn something good and receive a Christian instruction. This will come handy to me and my wife when we get old. With the last two groschen I maintain two sick sisters, whom I would not be compelled to keep----this I give for the Lord's sake."

The king, well pleased with his answer, said—

"Bravely spoken, old man. Now I will also give you something to guess. Have you ever seen me before?"

"Never," said the farmer.

"In less than five minutes you shall see me fifty times, and carry in your pocket fifty of my likenesses."

"This is a riddle which I cannot unravel," said the farmer.

"Then I will do it for you," replied the king.

Thrusting his hand into his pocket, and counting him fifty bran new gold pieces into his hand, stamped with his royal likeness, he said to the astonished farmer, who knew not what was coming----

"The coin is genuine, for it also comes from our Lord God, and I am his paymaster. I bid you adieu."----[*German Reformed Messenger.*

From the Southern Homestead.

The Use of Muck.

Messrs. Editors:----In this day of fertilizing humbugs, I fear that many farmers are disposed to overlook the mines of valuable manure they possess in the shape of muck. I believe that there is not one farmer in twenty fully appreciates it. Perhaps this is because it is too cheap and too easily procured.

Muck is simply decomposed matter that has accumulated in low spots by drainage, &c. That we may more clearly examine its true character, let us briefly review its various actions with reference to growing crops.

1. It furnishes by its decomposition fertilizing gases and minerals which are immediately available as food for plants.

2. It acts as an absorbent and retainer *in transitu*, of plant feeding materials which may come within its reach----readily yielding its accumulated stores to the roots of plants, but not readily to other influences.

3. It increases the power of the soil to absorb moisture.

4. It adds to its heat.

5. It improves its mechanical condition, rendering it more easy to cultivate and less liable to become crusted on the surface.

Thus we can easily sum up a few of the benefits arising from its use, but there are many more that might be brought forward.

If the farmers of Tennessee will pay more attention to this cheap article, they will certainly find their reward in the increase of their crops. F. G. L.

January, 1860.

The tongue of the wise useth knowledge aright; but the mouth of fools poureth out foolishness.

A soft answer turneth away wrath: but grievous words stir up anger.

For the Southern Planter.

"Vegetable Physiology."

Mr. Editor—Some months ago, you paid my work on "Scientific and Practical Agriculture," the compliment of copying into your valued paper, the chapters on Vegetable Physiology. In one of those chapters the following passage occurs:

"The food taken up by the roots and carried by the sap to the leaves, there meets with the gaseous food from the air, all together forming by their solution 'crude sap.' This is greatly modified during its circulation through the leaf, if an abundant supply of air be present. The change which the plant-food thus undergoes, we call 'digestion,' because of its resemblance to the changes produced on animal food by animal digestion. When the sap has thus been prepared for nourishing the plant, it is called 'latex,' or 'true sap.' It is then conveyed by the circulating organs to the various portions of the plant, and in some mysterious way, under the guiding finger of Omnipotence, assumes various forms of organic structure, producing stems and leaves, flowers and fruits. Here we have a beautiful analogy between the circulation of sap in plants, and the circulation of blood in animals."

The March number of the *Southern Planter*, which has just come to hand, has a criticism on certain points set forth in the foregoing paragraph. It is from the pen of Mr. Yardley Taylor. He objects—1. To the "theory of the downward circulation of the sap in plants." 2. He criticises the use of the word "dissolved," as expressing the condition of the gaseous food, (viz: carbonic acid) absorbed from the air by the sap. 3. He would substitute electricity for heat, as the chief agency "in the decomposition of carbonic acid gas in the sap of plants, and thus, (as he says,) making matters ready for assimilation through an upward circulation alone, we have a theory for growth that accords well with the simplicity of Nature's laws, and will account for all we see without bringing in mysteries to our aid." 4. In the mean time he takes occasion to throw out, for my benefit, the very sage and important suggestion, that "it would be well for those who are preparing elementary works, to examine into all recent discoveries in science, and profit thereby."

I am much obliged to Mr. Taylor for his very suggestive article; and shall always be obliged to him, or any one else, who may correct my scientific errors, or add to the little stock of information which I have been able to treasure up. For I am yet a learner,—a mere gleaner in the great field of scientific research—a field too broad to be passed over in one short life-time, and too full of unsolved *mysteries*, for the present generation, or even the next, to clear its way at every point.

Willingly, therefore, would I sit at the feet of Mr. Taylor, or any one prepared to give me instruction—especially one who can so readily solve the mysteries of vegetable growth. Will he be so kind, then, as to multiply his solutions? But, if he should find his pupil a little slow of apprehension, not always ready to adopt his "theories," and sometimes disposed to set up facts and authorities to be demolished, he must "take it all in good part," and only ply his arguments with greater vigor.

First, with reference to the circulation of sap, he seems to admit with me, that "the sap ascends from the root to the leaf, and carries with it in solution a portion of the material necessary for the nourishment of the growing plant;" and that "plants derive a large portion of their nourishment from the air, through their leaves, in the form of carbonic acid gas." So far we agree. Having, now, "a portion of the material necessary for the nourishment of the growing plant," brought up from the roots to the leaves; and another portion collected by the leaves from the air, we are left to infer, (so far as Mr. Taylor tells us anything to the contrary,) that it all remains in the leaves, except the water evaporated through their pores. On this point, some very reliable authorities differ from Mr. Taylor; and some still more reliable "known facts" are very much in the way of this new and very debatable theory—a theory advanced some time since, but not generally adopted. Who are our authorities?

The "New American Cyclopædia," on which Mr. T. rests his faith, says that "the ingenious Dr. Draper, of New York, has made some important observations" on the nourishment of plants, &c.,—and this ingenious Dr. Draper says: "by their action, (referring to the spongioles,) the fluid is forced up through the sap-wood into the leaves, and there exposed to the conjoint agency of sun and air. A change is thus

accomplished, and, from being crude, it turns into elaborated sap, and now *descends* through the bark, to be distributed to every part of the plant."—[*Physiology, p.* 87.]

The same Cyclopædia, under the article "Bark," has this language: "It [bark] is also the channel through which the sap *descends from the leaves*. The true bark, which separates from the wood, is only found in the exogenous and gymnospermous classes of plants. Its construction is of cellular tissue, traversed longitudinally by woody tissue, which is composed of woody tubes, through which the sap elaborated in the leaves *descends*."

But, under the head of "Agricultural Chemistry," this *New American Cyclopædia* had already said: "The vague ideas of the older vegetable Physiologists, according to which there is a constant circulation of sap in plants, an upward and a downward flow—the sap ascending in the outer wood to the leaves, there being eloborated, and returning through the inner bark to the roots, depositing new matter on its way, must be noticed here as an *exploded* but still oft-repeated error. There is no evidence that there exists any but an *upward* and outward current." Now, will Mr. Taylor take American Cyclopædia, vol. I., or American Cyclopædia, vol. II., as reliable authority? The two volumes certainly take opposite sides of the question.

Prof. Asa Gray, of Harvard, in his "Structural and Systematic Botany," p. 128, (Ed. 1858, a year after vol. I. of the New American Cyclopædia was published,) gives utterance to his views thus: "These last, [the proper cells of the liber or inner bark,] as they are peculiar to this part of the bark, are seldom if ever absent; they contain an abundance of mucilage and proteine, and in all probability they take the principal part in the *descending circulation* of the plant, if it may be so called, *i. e.*, in conveying *downwards*, and distributing the rich sap which has been elaborated in the foliage." On the next page he says: "While the new layers of wood abound in crude sap, which they convey to the leaves, those of the inner bark abound in elaborated sap, which they receive from the leaves and convey to the cambium layer or zone of growth. The proper juices and peculiar products of plants are accordingly found in the foliage and the bark, especially in the *latter*." Prof. Gray is certainly one of the leading botanists of this country; and one who would not be apt to advance theories which had been entirely "exploded." We might multiply recent authorities, but these may suffice for the present.

Let us now look at some of the "known facts." The New American Cyclopædia, vol. I., agrees with vol. II., and with most other books in the opinion, that carbonic acid, as an element of plant food, "is *rapidly absorbed* by the leaves of growing plants under the influence of sun-light, and undergoes decomposition in the vegetable cells, carbon being retained and assimilated, while the oxygen is set free, wholly or in part, and exhales from the leaves."—[Art. Agrl. Chemistry.] Admitting this as a "known fact"—and it has been repeatedly proved by experiment—pray tell us where this carbon is "retained and assimilated." Is it in the cells of the leaves alone? If this were so, we should find the leaves to be the largest and firmest part of the plant; but the "known fact" is just the reverse. Mr. Taylor thinks that, if the sap were to pass down from the leaves into the branches and trunk, "it is more reasonable to infer that the matters would be more deposited near the leaves than they are, thus making the top grow faster than the body." I suppose he will admit that the mineral matter formed in the plant comes from the soil through the roots. Then would it not be reasonable to suppose that these mineral "matters would be more deposited" near the root, than in the branches and leaves? Such, however, is not the case. The parts of nearly all plants most remote from the roots—the twigs and leaves—abound most in mineral substances, which have traversed both root and trunk. Might we not then reasonably suppose, that the carbon from the air could be carried down by descending sap, without being necessarily deposited more freely during the first, than during the last part of its descent?

Again he says: "It would be a mysterious way, indeed, to suppose a downward as well as an upward movement of the sap; the downward being much thickened by the evaporation of the superabundant water at first contained in it. This difficulty is not overcome by supposing the descent, beneath the bark, where most of the growth is made, for it must pass through the stem of the leaf where there is no known evidence of their passing each other. Accord-

ing to this theory it must pass through the pores of the sap-wood too, for it is well known that these pores gradually become more and more filled up by matter, until the texture of the heart-wood is assumed. How does this matter get there?" Here our author finds himself in two points of difficulty, on the supposition that the elaborated sap has to return from the leaf into the stalk. *First*, it must pass the ascending sap into the stem of the leaf. *Secondly*, it must find its way back to the cells of the sap-wood, in order to furnish the matter necessary to give this the "texture of the heartwood."

The microscope has done more than all other instruments and means combined to solve the problems of vegetable and animal physiology; and, among other things, it has solved the two difficulties here presented. It has shown us, in the first place, that the leaf consists of two somewhat distinct classes of cells. The first class, consisting of the woody tissue, is so arranged as to form the main body of the stem, with its almost innumerable divisions and sub-divisions, making up the whole frame-work of the leaf. The second, consisting of *cellular* tissue, is more soft and pulpy in its structure, and is called "parenchyma." The cells of the parenchyma contain the green substance of the leaf, and are found in the *stem* and its divisions, as well as in the blade of the leaf. The woody tissue of the stem is found to be connected with the sap-wood, and from it receives the sap and conveys it to the cells of the parenchyma in every part of the leaf, but chiefly to the lower surface of ordinary leaves, where it is condensed by evaporation and charged with carbonic acid from the air. It then passes from cell to cell of the parenchyma, undergoing that process of elaboration which fits it for nourishing the various parts of the growing plant, and passing through the lines of these cells to the inner bark, with which they are connected, it is attracted by "endosmosis" to all parts of the plant demanding nourishment. It finds its way to the sap-wood, and even to the heart-wood to some extent, through those lines of cells that connect the inner bark with all the layers of wood, forming what are called "medullary rays." Here, then, we have Mr. Taylor's second point of difficulty sat aside.

I will add one or two facts, which any one may readily verify, and which tend to confirm the theory of a descending circulation of the elaborated sap. 1. Let a strong cord be tied tightly around the body of a young and rapidly growing tree. As the tree increases in size, the tightening of the cord will check the downward flow of sap in the bark, and the part above the cord will grow more rapidly than the part below, the difference becoming very perceptible in two or three years. A similar result will follow, if instead of using the cord, a ring of bark a quarter of an inch, or less, in width be cut out carefully all around the trunk, in such a way as not to injure the soft outer-layer of the sap-wood. While the part above the ring grows larger than the part below, the ring will be gradually closed over from the *upper side*—showing an accumulation of matter from above.

"Analogy" does not necessarily imply very close resemblance, but only "likeness between things in some circumstances or effects, when the things are otherwise *entirely* different." When I speak of the "*analogy* between the circulation of sap in plants, and the circulation of blood in animals," I do not mean, that they bear any very close resemblance, for then I should not have used the word "analogy." Things may bear an analogy to each other which is very remote; but the degree of remoteness must be determined by what the mind already knows of the things brought under comparison. If Mr. Taylor, or any one else, wishes to know how nearly I regard the circulation of sap, as analogous to the circulation of blood, let him read the XXVI. chapter of my work on Agriculture, which gives a concise outline of Animal Physiology.

Secondly. As to the second point of Mr. T.'s criticism—the use of the word "dissolved"—I have only a few words to say in reply. The terms, "dissolve," "solution," "soluble," &c., are to be found in every respectable work on chemistry, and are used to express the relation of certain gases to water and other fluids, when these two forms of matter manifest a greater or less degree of affinity for each other. For example, "chlorine is *soluble* to a considerable extent in water," [*Fownes*]. "One measure of water will *dissolve* one* measure of carbonic

* Mr. Taylor says, "it is well known that water has a great affinity for that gas, and will imbibe *several times* its bulk of it without pressure." Is this one of his "recent discoveries in science"? My own experiments have fully con-

acid," [*Stockhardt*]. "At ordinary temperature and pressure, water *dissolves* the third of its weight of ammonia," (a gas) [*New Am. Cyclopædia!* These forms of expression have become incorporated into the language of science, and cannot now be easily eradicated.

Thirdly. His objection to giving *light* the credit of doing the *chief* part of the work in decomposing carbonic acid, will hardly bear the test of either authority or experiment. Recent writers speak thus: "The process of decomposition of carbonic acid takes place *only* during the day, as *light* is absolutely necessary for this process." [*Am. Journal of Science and Art—Nov.* 1858.] Again: "To undergo this important change (assimilation), the crude sap is attracted into the leaves, or other green parts of the plant, which constitute the apparatus of assimilation, where it is exposed to the *light* of the sun, under which influence *alone* can this change be effected." [*Gray*, 1858.]

Let my friend now try the following, or some similar experiment. Take a dozen (less or more) of open boxes or barrels, and having planted an equal number of hills of potatoes, turn a box or barrel bottom upward over every hill. Then bore several small holes in each bottom, and insert straight pieces of wire, so that they shall be in contact with the potato plants and the ground at one end, and shall rise as high as may be convenient into the open air. These wires will convey more electricity from the air to the plants, than they would collect in the ordinary way. Let them be kept thus covered, and well supplied with water and everything else they may demand except light, and if a half crop, or a tenth of a crop is produced, I shall yield the point at once.

No one has ever denied that electricity exerts an influence in the vegetable, as well as the animal kingdom. But when Mr. Taylor, or any one else, brings in the operations of electricity to solve the mysteries of natural phenomena, let him not forget that he is dealing with the most hidden and inexplicable of all mysteries. An agency, of which Prof. Faraday, the Prince of electricians, says: "There was a time when I thought I knew something about the matter; but the longer I live, and the more carefully I study the subject, the more convinced I am of my total ignorance of the nature of electricity."

If we would avoid the folly of attempting, at this stage of scientific development, to solve, and especially of saying we have solved, all mystery in the growth of either plant or animal, we must call in the help of some better known agent than electricity. We had better attribute much to "the guiding finger of Omnipotence," than to say, "we know all about it—Electricity has solved the whole mystery."

Fourthly. The very gentle hint in regard to "examining into all the recent discoveries in science," I shall thankfully accept, and endeavor to "profit thereby." Meantime I shall be glad to hear from my good friend again, although I have not the pleasure of a personal acquaintance with him. If either he, or "the philosophic editor of the *Flore des Ceres*," can bring forward *facts* well authenticated, and, by a legitimate process of reasoning based upon these facts, can show me that I am entertaining erroneous views, or advocating unsound theories in any department of science, instead of quarrelling with him, I shall tender him my most sincere thanks, and class him amongst my real benefactors.

J. L. Campbell.

Washington College, Lexington, Va., March, 1860.

vinced me, that water must be made very cold, before it will absorb near its own volume of carbonic acid under ordinary atmospheric pressure

For the Southern Planter.

Culture of Broom Corn.

Mr. Editor:

Having seen a notice in the March number of the Planter, that there is to be a broom manufactory in Richmond, and wishing to aid in encouraging Southern manufactures, I send you the following article on the

CULTURE OF BROOM CORN,

as my experience in raising the crop for the manufactory:

Plough and prepare the ground as usual for other corn. Lay it off in rows, three feet apart. If the land is strong and rich, put it in drills—if not, put it in hills two feet apart. One peck of seed to the acre is a plenty. Work it as you do other corn precisely.

In the Southern climate the brush is ready for harvesting about the middle of July, for the manufacture of brooms, as it should be cut when green, while the seed is

in milk. If the seed is required by the farmer, it can remain until fully ripe, but the brush will not command so good a price.

In harvesting, it should be cut off from the stalk from six to eight inches. The seed is usually whipped off by holding the brush on the cylinder of a threshing machine. In a small way, it can be cleaned off with a hackle.

In preparing it for market, dry it well in the sun, and tie it up in bundles of about ten pounds each.

The crop will yield from six to eight hundred pounds per acre, according to the quality of the soil.

The usual price paid is about $100 per ton.

In order to compete successfully with the Northern manufactories, it is desirable to obtain penitentiary labor in making up the brooms. Respectfully,

J. C. Marsh.

Baltimore, March 17, 1860.

More about Salt as a Preventive of Black Fire or Rot in Tobacco.

Since our call on Mr. Noland, page 238 of this number of our journal, the following letter has been received from him by our friend, Mr. Ruffin, and kindly placed at our disposal. It fully and satisfactorily answers to the object we had in view, when calling on Mr. N. for a detailed st tement of his practice and experience in reference to the remedial or rather preventive effect of salt, used with reference to the formidable disease—"fire-rot"—to which there is such a prevailing tendency in our growing crops of tobacco.—Editor.

Rox, March 21st, 1860.

F. G. Ruffin, Esq.,

Dear Sir:—You ask my experience in the use of salt as a preventive of fire in tobacco. I have used it for two years, at the rate of from one and a half to two bushels per acre—applied broadcast at the time of hilling. The first year I applied it only to a portion of my crop, and was so well satisfied of its value that I intended using it upon the whole crop last year. My supply, however, did not hold out, and I left a few thousand hills unsalted. This, as was the case with all the crops in my neighborhood, suffered much from firing, while the salted portion of my crop escaped almost unharmed. My protracted absence from home prevented my observing the effects of this application as closely as I otherwise would have done, but my overseer and neighbors testify to the efficacy of salt as a preventive of fire; and the condition of my crop now coming into market is stronger evidence still in its favor.

Yours truly,

R. W. N. Nowland.

For the Southern Planter.

Seed Corn.

Mr. Editor:

The many questions asked me concerning the improved seed-corn advertised for sale by me in your last number of the Planter, have induced me to communicate the mode by which I have effected the improvement. Twenty years ago I selected my seed-corn from several places, of different kinds; some soft and some hard and flinty. I took the nubs off from both ends of the ears; shelled the corn and mixed it before planting, always carefully avoiding in my selection the blue, yellow or red grains, and the red husk. Since then I have carefully selected each year, at shucking time, such ears as I liked best—always keeping in view a deep grain and a white husk. At planting time, if I thought my corn was too hard, I selected more soft, to mix in with the seed. By doing this I found that I could make my crop harder or softer, to my liking.

Yours, respectfully,

Garland Hanes.

I will give you my method of planting and working the corn in time for your next number. G. H.

On Science, as a Branch of Education.

The following is an abstract of a lecture on the above subject, recently delivered before the Royal Institution, London, by Professor Faraday. The high position of this gentleman always secures attention for his opinions; but, upon this topic especially, his views will be examined with great interest.

The development of the applications of physical science in modern times has become so large, and so essential to the well-being of man, that it may justly be used as illustrating the true character of pure science, as a department of knowledge, and the claims it may have for consideration by governments, universities, and all bodies to whom is confided the fostering care and direction of learning. As a branch of learning, men

are beginning to recognize the claim of science to its own particular place; for, though flowing in channels utterly different in their course and end to those of literature, it conduces not less, as a means of instruction, to the discipline of the mind; whilst it ministers, more or less, to the wants, comforts, and proper pleasure, both mental and bodily, of every individual of every class in life. Until of late years, the education for, and recognition of it, by the bodies which may be considered as giving the general course of all education, have been chiefly directed to it only as it could serve professional services,—namely, those which are remunerated by society; but, now the fitness of University degrees in science is under consideration, and many are taking a high view of it, as distinguished from literature, and think that it may well be studied for its own sake,—*i. e.*, as a proper exercise of the human intelligence, able to bring into action and development all the powers of the mind. As a branch of learning, it has, without reference to its applications, become as extensive and varied as literature; and it has this privilege, that it must ever go on increasing. Thus it becomes a duty to foster, direct, and honor it, as literature is so guided and recognized; and the duty is the more imperative, as we find by the unguided progress of science and the experience it supplies, that of those men who devote themselves to studious education, there are as many whose minds are constitutionally disposed to the studies supplied by it, as there are of others more fitted by inclination and power to pursue literature. The value of the public recognition of science as a leading branch of education may be estimated in a very considerable degree by observation of the results of the education which it has obtained incidentally from those who, pursuing it, have educated themselves. Though men may be specially fitted by the nature of their minds for the attainment and advance of literature, science, or the fine arts, all these men, and all others, require first to be educated in that which is to be known in these respective mental paths; and when they go beyond this preliminary teaching, they require a self-education directed (at least in science) to the highest reasoning power of the mind. Any part of pure science may be selected to show how much this private self-teaching has done, and by that to aid the present movement in favor of the recognition generally of scientific education in an equal degree with that which is literary; but perhaps, electricity, as being the portion which has been left most to its own development, and has produced as its results the most enduring marks on the face of the globe, may be referred to. In 1800 Volta discovered the Voltaic pile—giving a source and form of electricity before unknown. It was not an accident, but resulted from his own mental self-education. It was, at first, a feeble instrument, giving feeble results; but, by the united mental exertions of other men, who educated themselves through the force of thought and experiment, it has been raised up to such a degree of power as to give us light, and heat, and magnetic and chemical action, in states more exalted than those supplied by any other means. In 1819 Oersted discovered the magnetism of the electric current, and its relation to the magnetic needle; and as an immediate consequence, other men, as Arago and Davy, instructing themselves by the partial laws and action of the bodies concerned, magnetized iron from the current. The results were so feeble at first as to be scarcely visible; but, by the exertion of self-taught men since then, they have been exalted so highly, as to give us magnets of a force unimaginable in former times. In 1831 the induction of electrical currents, one by another, and the evolution of electricity by magnets, was observed,—at first in results so small and feeble that it required one much instructed in the pursuit to perceive and lay hold of them; but these feeble results, taken into the minds of men already partially educated and ever proceeding onwards in their self-education, have been so developed as to supply sources of electricity independent of the Voltaic battery on the electric machine, yet having the power of both combined in a manner and degree which they, neither separate nor together, could ever have given it, and applicable to all the practical electrical purposes of life. To consider all the departments of electricity fully, would be to lose the argument for its fitness in subserving education in the vastness of its extent; and it will be better to confine the attention to one application, as the electric telegraph, and even to one small part of that application, in the present case. Thoughts of an electric telegraph came over the minds of those who had been instructed in the nature of elec-

tricity as soon as the conduction of that power with extreme swiftness through metals was known, and grew as the knowledge of that branch of science increased. The thought, as realized at the present day, includes a wonderful amount of study and development. As the end in view presented itself more and more distinctly, points, at first, apparently of no consequence to the knowledge of the science, generally rose into an importance which obtained for them the most careful culture and examination, and the almost exclusive exercise of minds, whose powers of judgment and reasoning had been raised first by general education, and who, in addition, had acquired the special kind of education which the science in its previous state could give. Numerous and important as the points are, which have been already recognized, others are continually coming into sight as the great development proceeds, and with a rapidity such as to make us believe that, much as there is known to us, the unknown far exceeds it; and that, extensive as is the teaching of method, facts and law, which can be established at present, an education looking for far greater results should be favored and preserved. The results already obtained are so large as even in money value to be of very great importance;—as regards their influence upon the human mind, especially when that is considered in respect of cultivation, I trust they are, and we will be, far greater.

No intention exists here of comparing one telegraph with another, or of assigning their respective dates, merits or special uses. Those of Mr. Wheatstone are selected for the visible illustration of a brief argument in favor of a large public recognition of scientific education, because he is a man both of science and practice, and was one of the very earliest in the field, and because certain large steps in the course of his telegraphic life will tell upon the general argument. Without referring to what he had done previously, it may be observed that, in 1840, he took out patents for electric telegraphs, which included, amongst other things, the use of electricity from magnets at the communicator,—the dial face,—the step-by-step motion,—and the electro-magnet at the indicator. At the present time, 1858, he has taken out patents for instruments containing all these points; but these instruments are so altered and varied in character, above the former, that an untaught person could not recognize them. The changes may be considered as the result of education upon the one mind which has been concerned with them, and are to me strong illustrations of the effects, which general scientific education may be expected to produce. In the first instruments powerful magnets were used, and keepers, with heavy coils associated with them. When magnetic electricity was first discovered, the signs were feeble, and the mind of the student was led to increase the results by increasing the force and size of the instruments. When the object was to obtain a current sufficient to give signals through long circuits, large apparatus were employed, but these involved the inconveniences of inertia and momentum; the keeper was not set in motion at once, nor instantly stopped; and, if connected directly with the reading indexes, these circumstances caused an occasional uncertainty of action. Prepared by its previous education the mind could perceive the disadvantages of these influences, and could proceed to their removal; and now a small magnet is used to send sufficient currents through 12, 20, 50, 100, or several hundred miles; a keeper and helix is associated with it, which the hand can easily put in motion; and the currents are not sent out of the indicating instrument to tell their story, until a key is depressed, and thus irregularity contingent upon first action is removed. A small magnet, ever ready for action and never wasting, can replace the Voltaic battery; if powerful agencies be required, the electro-magnet can be employed without any change in principle or telegraphic practice; and as magneto-electric currents have special advantages over Voltaic currents, these are in every case retained. These advantages I consider as the result of scientific education, much of it not tutorial but of self: but there is a special privilege about the science branch of education, namely, that what is personal in the first instance immediately becomes an addition to the stock of scientific learning, and passes into the hands of the tutor, to be used by him in the education of others, and enable him in turn, to educate himself. How well may the young man, entering upon his duties in electricity, be taught, by what is past, to watch for the smallest signs of action, new or old; to nurse them up by any means until they have gained strength; then to study their laws, to eliminate the

essential conditions from the non-essential, and, at least, to refine again, until the incumbering matter is as much as possible dismissed, and the power left in its highly developed and most exalted state. The alterations and successions of currents, produced by the movement of the keeper at the communicator, pass along the wire to the indicator at a distance; there each one for itself confers a magnetic condition on a piece of soft iron, and renders it attractive or repulsive of small, permanent magnets; and these acting in turn on a propelment, cause the index to pass at will from one letter to another on the dial-face. The first electro-magnets, *i. e.*, those made by the circulation of an electric current round a piece of soft iron were weak; they were quickly strengthened, and it was only when they were strong that their laws and actions could be successively investigated. But now they are required small, yet potential. Then came the teaching of Ohm's law; and it was only by patient study, under such teaching that Wheatstone was able so to refine the little electro-magnets at the indicator as that they should be small enough to consist with the fine work there employed, able to do their appointed work when excited in contrary directions, by the brief currents flowing from the original common magnet, and unobjectionable in respect of any resistance they might offer in the transit of these tell-tale currents. These small transitory electro-magnets attract and repel certain permanent magnetic needles, and the to-and-fro motion of the latter is communicated by a propelment to the index, being there converted into a step-by-step motion. Here every thing is of the finest workmanship; the propelment itself requires to be watched by a lens, if its action is to be observed; the parts never leave hold of each other; the vibratory and rotatory ratchet-wheel and the fixed pallets are always touching, and thus allow of no detachment, or loose shake; the holes of the axes are jewelled; the moving parts are most carefully balanced,—a consequence of which is, that agitation of the whole does not disturb the parts, and the telegraph works just as well when it is twisted about in the hands or placed on board a ship, or on a railway carriage, as when fixed immovably.

Now, there was no accident in the course of these developments;—if there were experiments, they were directed by the previously acquired knowledge;—every part of the investigations was made and guided by the instructed mind. The results being such (and like illustrations might be drawn from other men's telegraphs, or from other departments of electrical science,) then, if the term education may be understood in so large a sense as to include all that belongs to the improvement of the mind, either by the acquisition of the knowledge of others, or by increase of it through its own exertions, we learn by them what is the kind of education science offers to man. It teaches us to be neglectful of nothing;—not to despise the small beginnings, for they precede, of necessity, all great things in the knowledge of science, either pure or applied. It teaches a continued comparison of the small and great, and that under differences almost approaching the infinite: for the small as often contains the great in principle as the great does the small; and thus the mind becomes comprehensive. It teaches to deduce principles carefully, to hold them firmly, or to suspend the judgment—to discover and and obey *law*, and by it to be bold in applying to the greatest what we know of the smallest. It teaches us first by tutors and books to learn what is known to others, and then, by the lights and methods which belong to science, to learn for ourselves and for others;—so making a fruitful return to man in the future for that which we have obtained from the men of the past. Bacon, in his instruction, tells us that the scientific student ought not to be as the ant, who gathers, merely; nor as the spider, who spins from her own bowels; but rather as the bee, who both gathers and produces. All this is true of the teaching afforded by any part of the physical science. Electricity is often called wonderful—beautiful;—but it is so only in common with the other forces of nature. The beauty of electricity, or of any other force, is not that the power is mysterious and unexpected, touching every sense at unawares in turn, but that it is under *law*, and that the taught intellect can even now govern it largely. The human mind is placed above, not beneath it; and it is in such a point of view that the mental education afforded by science is rendered supereminent in dignity, in practical application and utility: for, by enobling the mind to apply the natural power through law, it conveys the gifts of God to man.—(*Annual of Scientific discovery*, 1859.

The Southern Planter.

RICHMOND, VIRGINIA.

Virginian Independence.*

In the speech referred to in the note below, the object of the speaker in addressing the members of the State Legislature and others on the independence of Virginia in her commercial, agricultural and educational relations, seems to have been to show, by an imposing array of facts and figures industriously collected and judiciously collocated, that the course of former legislation, and of the practice of our citizens, has been such as to operate disastrously to the several State interests referred to, and in effect to discriminate against Virginia, and in favor of her Northern rivals, and most persistent, implacable and malignant traducers. He also shows that whilst Virginia, as the legitimate fruit of her impolitic legislation, and suicidal policy, has been shorn of her power and just influence, the North has fattened upon the spoils wrested from her in the struggle for supremacy—a struggle rendered unequal only by self-imposed disabilities on her part; and that whilst Virginia has been "degraded" by misgovernment, the North who has been "benefitted" at her expense—has tauntingly exulted in what has been Virginia's slow progress and development, in comparison of what they would have been under a wise and patronizing system of legislation, and of self-reliant adherence to, and liberal support of home industry and her home institutions, and also a more exclusive devotion of her resources to the up-building of her own educational institutions, and the fostering and encouraging of a literature peculiarly her own, or, at least, a literature of a strictly Southern character

The growing decadence of the power and influence of Virginia, and the growth and progress of New York in these elements, are shown in the following table, exhibiting the representation of these two States in the Congress of the United States for each decade, from 1790 to 1850 inclusive:

	Prior to 1790.	In 1790.	In 1800.	In 1810.	In 1820.	In 1830.	In 1840.	In 1850.
Virginia had.....	10	19	22	23	22	21	15	13
New York had.....	6	10	17	27	34	40	34	33

"But the *commerce* of these two States," says Mr. London, "presents a picture worthy of the profoundest attention."

Passing by the commercial statistics (which he adduces) of Virginia and Maryland combined, as compared with New York, for the period extending from 1750 to 1770 inclusive, we cite the comparison of "Virginia *alone*," with New York," as found in the following tables showing the imports and exports of these two States in 1791, and onwards to the close of the fiscal year in 1850.

"1791—Virginia imports,.....$2,486,000
Virginia exports,..... 3,131,000
New York imports,..... 3,022,000
New York exports,..... 2,505,000

"At this period (1791), these two States were nearly equal.

"Let us now see the appalling picture of the exports and imports of these two States in the years following:

	Virginia.	New York.
Imports in the year 1821,	$1,078,490	$23,629,246
Exports " " 1821,	3,079,099	13,162,917
Imports " " 1830,	405,739	35,624,070
Exports " " 1830,	4,791,644	19,697,983
Imports " " 1840,	545,085	60,440,750
Exports " " 1840,	4,778,220	34,264,080
Imports " " 1850,	426,599	111,123,524
Exports " " 1850,	3,415,646	52,712,789

"By whose action," asks the speaker, "has this condition of affairs been produced? Who has deprived Virginia of her once flourishing foreign commerce? Who has neglected her interests? Who has plundered her husbandmen of their labor? Who has turned her seaports into neglected villages? Whose blighting hand has dwarfed her representation in the national legislature, till she is too feeble even to be respected where she was once powerful? In vain is it answered, that the institution of slavery has produced this result. Slavery existed in Virginia in the days of her prosperity as well as it

* Speech of Daniel H. London, Esq., on the Commercial, Agricultural and Intellectual Independence of Virginia and the South—delivered in the Hall of the House of Delegates, on the 5th of January, 1860. A Pamphlet of 52 pages, to be procured at Randolph's, 121 Main Street, Richmond.

does now. It cannot be answered that it is due to a want of intelligence and adaptation for commercial or agricultural pursuits in our people. Such an affirmation is a libel on the most virtuous and intelligent people in the United States."

* * * * * "To these questions," and others here omitted, "there is but one, and only one answer, and that is this:—IT IS THE PERNICIOUS HAND OF GOVERNMENT which has degraded us and benefited others."

The speaker then introduces "*A Table, showing the number of Vessels, Tonnage, Men employed, and the Bounties in the Whale, Mackerel, and Cod Fisheries,*" which, for the sake of brevity, we omit, extending over a period of sixty-seven years. Deducting "the years of war," in which no bounties were paid, it appears that in sixty-three years, the aggregate of bounties paid was $12,120,532, averaging, annually, $192,389 40.

The effect of this legislation of the Federal Government, during all this protracted period, has been "to transfer the results of the toil of the people of Virginia, and of the Southern States, to the benefit of others; and at this very time, about three hnndred thousand dollars are paid, annually, out of the Federal Treasury to the citizens of Massachusetts, New Hampshire, and Maine, for catching cod fish; and the statistics disclose the fact, that more than $12,000,000 of public money have been, by the act of a common government, extracted from the people of this State, in part, to be lavished upon a vocation in which the people of Virginia have no interest; for, if there is any one article of food, in all the world, *not used* by our people, it is cod fish."

"*The navigation laws,*" continues the speaker, "by which foreign vessels are forced out of the coasting trade, and their exclusion from our ports, except under regulations designed to benefit the ship owners of the Northern States, where it was and is known that this interest chiefly exists, are detrimental to our interests.

"The reciprocity treaty, by which Canadian wheat and breadstuffs are admitted free, brought into Northern markets, in 1857, ten millions one hundred and ninety-one thousand five hundred and thirty-two dollars worth of grain and flour, to exclude the grain and breadstuffs of Virginia and other Southern States. (See Commercial Relations in 1858, page 60.)

"These items are not all to which allusion might be made, but they suffice to justify the statement, that Virginia and her sister Southern States can look to the action of the Federal Government with no prospect of justice and consideration.

"But the worse than indifferent, yea, the baneful legislation which has been pursued by Virginia herself, affecting her own commerce and her own agriculture, must now be examined. Surely, it is not necessary to say [The Italics ours] *that the legislation of any free people is defective, when the laws that should protect the laborer and secure to him the fruit of his own toil, are so framed as to wrench from his hand the just equivalent for his labor, and place it in the possession of another, especially when that other is not a friend.*

"The laws respecting merchants' licenses are so framed as that the grossest inequality prevails throughout the whole State, and the operations of the tax for merchants' licenses is a direct bonus to every retail merchant in the State, to go beyond the limits of Virginia to procure his supplies."

These positions are sustained by facts and arguments, which it would lead us too much into detail to present here, but we cannot overlook the remarks of the speaker regarding the unjust, unequal, and, in some cases, the oppressive operation of one of these laws. We mean the license law:—

"This section, it will be thus seen," referring to the 12 classes unto which the tax bill decided the merchants "is a positive and malignant injustice to the small and feeble merchants, and bears heavily on them; whilst the princely and powerful are burdened so lightly as to make the conclusion inevitable that if the legislature had any object in view, it was to oppress the small retailer, of whom the poor are *obliged* to buy in many instances, and to protect the large and opulent merchant from bearing the same proportionate burden as the poor man engaged in the same vocation bears. for the privilege of selling goods, wares and merchandise upon the soil of Virginia. If sales are to be taken as an index to the property or capital of the merchant, then apply the same rule to all. * * * . If the object has been to derive the largest revenue from the amount of goods sold in the State, then the means adopted have been the least sagacious, for *the largest operator pays the very smallest pro rata tax;* but if the object has been to induce the interior merchant to seek the markets of other States to procure his supplies, the wisdom of this clause in our tax bill may be commended, as it in fact operates as a bonus of from one to two state taxes—in many instances a discrimination against our own citizens, from whom the State has demanded and received a license tax to carry on a lawful business, on the soil of Virginia. Was this the object of the law? If so, *continue* it; but if any other purpose can be divined for the measure, then show the end and object of its existence."

In vindication of the assertion that the license law operates "to induce the interior merchant to seek the markets of other Staies to procure his supplies," the speaker shows, that "$100 worth of goods brought into the State of Virginia from any other State by a merchant selling," the mean average of "$40,000" worth of goods per annum sold to a jobber" "and then sold to a retail-

er"—the effect will be a discrimination against Virginia, and an inducement to the retailer to purchase goods elsewhere of 1 16-000dths per cent. on the value of his purchasers. which is demonstrated as follows:

"The wholesale dealer would pay.....	$0 52
2d. The jobber of class No. 9, would pay	64
3d. The retailer would pay in class No. 7.	1 01
Whole amount of taxes collected by the State.....	$2 17
But if the retailer, No. 7, will go out of the State and buy his stock, and sells them in Virginia, he will pay only.....	1 01
Balance in favor of buying out of Virginia by the laws of this State...	$1 16

The inequality and injustice of this is plainly seen in the light of our State Constitution, which "indicates equal justice to all vocations, the poor and the rich alike."

But a still greater inequality and more obvious injustice is perpetrated by this license law, first in the discrimination it makes in favor of the *beginner* upon a large scale, and against the merchant of like extent of business *on the second year* of his mercantile operations—a discrimination so great as to operate as a temptation and an inducement to the merchant to change his business and begin anew every year! and secondly, in its reverse operation it burdens and oppresses the poor trader, who, "unless he can swear that his capital is less than $500, must pay the same sum, [sixty dollars,] without regard to his sales or his capital." May not a change be effected in this law, which, while the same amount of revenue shall be derived from it, will operate more justly and equally, and of consequence more advantageously "upon the commercial, agricultural, and manufacturing interests of Virginia." The remedy proposed by the speaker is the adoption by the State of the following "principles, namely, that no article of merchandize ought to pay more than *one State tax on its sale* in Virginia, and that no merchant, no matter how wealthy, or how large his business, ought to be allowed to prosecute it, without contributing the same *pro rata* upon his sales, that the poorest man is made to pay for a *like privilege*." * * * * * * He continues: "The principles suggested above, can be safely and judiciously embodied in the provisions of any act which may be passed upon the subject of merchants' licenses. From time immemorial, Virginia has discriminated in favor of the agricultural products of her own people, and of all the other States," and for many years" "*she did not tax any goods sold on her soil, except those from foreign countries.* She may now properly apply principles which she has exercised to her own detriment for so long a time, and make them of great advantage to every interest. The following are worthy of consideration, in the number of articles to be sold, without any discrimination against them, viz: Raw cotton, rice, brown sugar, molasses, wheat, flour, and all other breadstuffs, tobacco, all products of the forests of the southern slave States; hemp, flax, wool, indigo, madder, logwood, and all other dye stuffs; gypsum, guano, horses, mules, asses, meat, cattle, hogs, sheep, and other live stock; beef, pork, lard, meats, oil of all kinds, fishes, minerals of every kind obtained in any slave State; and any goods, wares, or merchandise, the product of any slave State."

"It is due to our pecuniary interests as a people, that all direct importations from abroad should be exempt from every burden, when we are advised of the fact that one single vessel of 800 tons coming to James river from Liverpool with salt even, discharging and taking in a cargo of flour and tobacco for Europe, will distribute as much money as almost every vessel now engaged in the coasting trade distributes in a whole year. This fact can be shown by competent testimony; but beyond this, another fact that our products find a market in foreign countries chiefly, and not in the northern States, renders it too clear that our true interests must indicate the most direct and untrammeled intercourse with those who consume our products. But the fact that we have been deprived of our foreign commerce by the laws of the federal government and our own State government combined, must suggest the duty of using the *reserved* powers of the State for regaining that trade which has been driven away from our own seaport towns. But, as the acts of our own State are now before us, *the pilot laws* of Virginia must constitute a subject of remark; and that the folly of these measures may be brought to view, it is only necessary to state that it is made obligatory on *every vessel, unless* loaded with coal, engaged in the foreign trade, to employ a pilot, whether he be needed or not, when she approaches our waters; whereas no coasting vessel is required to employ a pilot unless she chooses.

The charge on plaster for pilotage to Richmond, when brought directly from the places where it is produced, is as much as twice its cost frequently, and upon other articles, in the same ratio by the foot, according to the draft of the vessel, upon no other pretext, as appears by the law in the Code, than that she is engaged *in the foreign trade*, whether owned or not in this State. Surely all reasoning is at an end with the law-making power of the State, when it shall be necessary to argue that an agricultural

people ought not to burden the vessels of their own citizens and others which are engaged in bringing them articles of prime necessity and of general use, whilst the vessels of those *who have sometimes been purloining their property* in open violation of the laws of the State, are allowed to enter our waters, participate in our commerce, and come and go with cargoes of any size, with not a single farthing exacted of them without the positive contract of the captain of their vessels; and this, too, whether the vessel is owned or not by a Virginian. This unwise discrimination against our foreign commerce is, as a measure of State policy, in no way defensible."

* * * * * "If the pilots of Virginia cannot subsist without this measure, in the shape in which it now stands, then it will be better to make a *direct appropriation* from the treasury of the State for their benefit, and let the voluntary principle be applied to them and their interests. When a captain wishes to employ a pilot, let him do it at such charges as may be thought reasonable, or make all vessels, whether coastwise or foreign, pay the same and be compelled to take the first pilot that offers his services, when the vessel approaches the waters of Virginia." The charges for pilotage will be seen to be most oppressive, when we are told that there are imposed by the existing laws "charges of from one dollar and fifty cents to two dollars and twenty-five cents from sea to Hampton Roads, and a further charge of four dollars and thirteen cents to Richmond, per foot, making the average of more than *six dollars the foot up to our chief town and nearly as much going out* —together about twelve dollars." No wonder then is it that "but few, if any of our citizens" engage "in direct foreign trade," when by employing any coasting vessel "to transport the cargo to New York or elsewhere out of the State, we may escape these charges in Virginia altogether." * * * * * A correspondent of Mr. London's states the following significant fact: "A vessel drawing 15 feet of water, coming to Richmond with plaster from Nova Scotia *direct*, has to pay $1 00 to $1 50 for a pilot, equivalent to $1 per ton tax on plaster, while a vessel from Massachusetts or Maine, with a coasting license, takes no pilot, brings plaster subject to no tax, and pays the northern man his profit." Now who is it that pays this tax of one dollar per ton on an article of prime necessity and therefore entitled, if any thing is so entitled, to immunity from taxation? We ask again upon whom does this tax fall of two hundred and fifty per cent. upon its cost (40 cents per ton) in Nova Scotia? Upon the farmers and planters of Virginia, of course. And to whom goes this extra dollar of the cost of this fertilizer, but into the pockets of their Yankee enemies?

Similar losses are entailed upon Virginia by the operation of those laws as regards our West India trade where we find a ready market for "flour, corn, meal, staves, hoop-poles, and provisions," and from whence we receive in return "sugar and coffee," articles of general use and prime necessity. "Surely," says Mr. London, "the legislative body will bear no longer the humiliating attitude that they present to the world, of using the powers of the State to impoverish our own people so as to benefit those who have already received so much from the labour of the people of Virginia and the South." He then introduces the following table, attributed to M. R. H. Garnett, Esq., showing "that each man in the South pays the following unequal sums as compared with the North in the years named, to wit:

	South per head.	North per head.
Years from 1791 to 1800, -	$21 60	$11 25
" 1801 to 1810, -	31 27	13 56
" 1811 to 1820, -	32 37	10 37
" 1821 to 1830, -	34 71	7 12
" 1831 to 1840, -	27 42	4 29
" 1841 to 1845, -	10 46	1 99

And that the South lost in the foreign trade the use of $133,472,827 of her capital in the year 1848, and the North gained it—besides paying to the federal government as taxes the sum of $26,000,000, twenty-three millions of which was spent beyond our borders. For the year 1858, upon the same principles, the South lost the use of about $225,000,000 of her capital, taking our exports and imports as the basis of the calculation. These figures are frightful when the fact is disclosed that the citizens of Massachusetts absolutely receive two dollars in pensions and bounties whilst they pay only $1 99 in taxes. The amount yearly taken from the labour of the South to benefit the Northern people by the laws of Congress is too huge for any freeman to contemplate with patience, and for the Legislature of Virginia to be intercepting a trade which might go directly from her

producers to those who need their products, and to divert these articles of trade into the hands of those who are not our friends, and that, too, at so frightful a cost, is too absurd to be anticipated."

Mr. London then adverts to the transactions of the Virginia Banks, and points out what he conceives to be the hurtful tendencies of their operation in regard to the interests of Virginia, &c., but space fails us for pursuing the subject further. We must conclude by referring the reader to the speech itself, exhorting the farmers and planters of Virginia to stand up to the defence of their own best interests, by abstaining from the use of everything of Northern origin which they can produce at home, and to patronize their own institutions of learning, their own literature, their own mechanics and artisans, produce their own hay, manufacture their own brooms, and, in fine, to establish to the extent that may be found practicable, a home market for their productions through the exchanges of commodities that must naturally occur between the farmer and mechanic to their reciprocal advantage.

W.

Richmond Enterprise.

We have here several *new* factories of different kinds; among them the Mills of Messrs. S. McGruder's Sons and S. Hartman for grinding bones, and Manipulating Guanos. Mr. F. G. Ruffin, and Messrs. Edmond Davenport & Co., have had mills in operation for some months for the same purpose; so that our Virginia farmers can buy at home, manipulated guano, ground bones, super-phosphate of lime, &c., &c. Nay, more, if they do not want to buy, but merely to satisfy any curiosity they may have as to the manner of preparing these fertilizers, they can at all hours of the day find the Mill doors open, and are free to give everything in them a careful inspection, while their gentlemanly owners will take pleasure in showing them every part of their process, and in answering any questions they may feel disposed to ask.

They have no secrets as to the articles out of which their fertilizers are compounded, but everybody is invited to come and examine for themselves.

Improved Stock and Farming Implements.

We extract from the *Enquirer* of the 21st of March, the article below, (to which our attention has been called by a friend to merit and a patron of public improvement.) respecting the claims of our esteemed friend, Dr. John R. Woods, of Albemarle, to "the gratitude and respect" of the agricultural public for his "contributions . . . . in the cause of improvement in stock-raising, farming implements, and general husbandry." We have frequently adverted to Dr. Woods' public spirit and enterprise in introducing high types of improved breeds of stock, and have often heard his farm management much extolled, but we have not yet fulfilled a, too long deferred, purpose of visiting his hospitable mansion, whereby we may, like "Agricola," be enabled as an eye-witness to testify of the things whereof we have seen. We readily adopt as our own his article subjoined with but this exception, that until "*Ram*" shall, by universal suffrage, be voted out of the circle of the Zodiac, and be replaced by the more euphonious and delicate (?) but hirsute cognomen of "*Buck*"—a name patent only so far as sheep are concerned to Major Jack Downing's "Old *Bill*," the interchangeable synonym of *Buck*—we shall insist, with all the vehemence of Unkle Toby, upon calling a *Ram*—RAM!

"IMPROVED STOCK AND FARMING IMPLEMENTS.

"The merits of politicians and their public services, rarely fail to be sufficiently noticed through the press; public admiration and respect are freely invoked in their behalf; but it sometimes happens that efforts made by gentlemen to promote the good of the community, in the more humble but not less important department of agriculture, do not receive the acknowledgement that their liberal public spirit deserves. I am led to make these reflections by the contributions made by *Dr. John R. Woods, of Albemarle*, in the cause of improvement in stock-raising, farming implements and general husbandry.

"Dr. Woods has been very attentive to the different fertilizers in use for some years past, and has been active in recommending, by his example, their introduction into general use, and thus, perhaps, is entitled to much of the credit of the great improvement of lands in Albemarle. To his example and efforts, in a good degree, is to be attributed the now general popularity of the wheat drill, the most valuable accessory to the success of wheat culture.

"In the improvement of the breed of horses, he has made some sacrifices. Two years ago he undertook to import two stallions from Eng-

land, 'Havelock' and 'Napier.' The first a Cleveland bay, arrived safely, but did not meet his expectations; and Napier, of a more high bred stock, and said to be one of the finest horses ever raised in England, died on the passage to America. He did not succumb under these disappointments, but ordered another Cleveland bay, and in this last instance has been eminently successful in procuring a splendid specimen of a horse for general utility.

"His horse 'Symmetry' is a dark, dapple bay, sixteen and a half hands high, of commanding presence, full muscle, and powerful bone. Owing to the perfect proportions of all his parts, you do not realize that he is a very large animal until you stand close to him.

"Dr. Woods has laboured a good deal in the improvement of hogs and sheep. He has just imported a most magnificent buck, of the Cotswold stock, to cross on his present flock, that will compare with any, I presume, in Virginia.

"The sight of these two imports will repay a visit of one hundred miles to his hospitable mansion; which, in examining the results of his good farming, can scarcely fail to be a source of profit as well as pleasure to any one, as it certainly was to

"AGRICOLA."

For the Southern Planter.

Experiments with American and other Guanos.

MR. EDITOR:—In the March number of the Southern Planter you ask for experiments with the American Guano. Having, last year, made some experiments with it and with other guanos, in order to test their respective merits, applied to both corn and tobacco, in which I was very particular, and, I believe, accurate, I now submit the results of the experiment on corn, and will, if you desire it, communicate hereafter the particulars of the one on Tobacco.

I selected a very poor piece of land for the experiment on corn, such as would not have produced more than five bushels per acre, if as much.----the selection being made of land thus poor, the better to test the strength and productiveness of the different guanos used. I marked off three acres, all as nearly equal as could be determined by the eye, and after thoroughly ploughing and preparing the land, I applied on the 30th of April to one acre 200 lbs. of American Guano, costing $40 per ton of 2000 lbs., which was an outlay of $4 per acre; on another acre I applied 200 lbs. of Kettlewell's Manipulated Guano, costing $52 per ton of 2000 lbs.---an outlay of $5.20 per acre; and on the third acre 200 lbs. of Peruvian Guano, costing $59 per ton of 2000 lbs.----or $5.90 per acre. These several applications were made broadcast, and the guanos thoroughly incorporated with the soil. The corn was all planted on the same day, and the after cultivation was neat and thorough, but in the month of August it all suffered intensely with drought, for about three weeks, which I think curtailed the crop very much. It is proper that I should state that the same number of stalks grew upon each acre---- there being not a missing hill in either. In the month of November, the product of each acre was carefully gathered and stored away by itself; and in January, after having become thoroughly dry, each parcel was shucked, shelled, measured and weighed separately, and the result is as follows:

The American Guano made 784 lbs. per acre, which was 196 lbs. of corn for each dollar expended, and it weighed 55 lbs. per bushel.

The Kettlewell's Manipulated made 1176 lbs. per acre, which was 226 lbs. for each dollar expended, and the corn weighed 56½ lbs. per bushel.

The Peruvian Guano made 1224 lbs. per acre, which was 207 lbs. of corn for each dollar expended, and the corn weighed 54 lbs. per bushel.

These experiments were fairly made, are correctly stated, and prove conclusively that the manipulated guano is the best and cheapest application for corn. But every gentleman can test the calculations, judge for himself respecting the peculiarity of the season, and deduce from the premises his own conclusions.

All which is respectfully submitted,

R. H. ALLEN,
Oral Oaks, Va.

MARCH 23d, 1860.

We are very much indebted to Mr. Allen for the above communication, and will be still further obliged to him for the resuls of his experiments on Tobacco, which he so kindly offers to furnish.

Maryland State Agricultural Chemist.

We are under obligation to Philip T. Tysom, Esq., "State Agricultural Chemist," for a copy of his report to the Legislature of Maryland. We shall fully avail ourselves, in a future number, of some of the many facts and valuable suggestions with which the report abounds, by laying them before our readers. We regret having to delay their publication on account of the pre-occupation of our columns at this time.

Broom Corn.

Mr. P. Horton Keach tells us that the average price of Broom Corn, per ton of 2,000 lbs., will be about one hundred dollars. A first rate sample will bring rather more than the price named.

Lieut. Maury's Speech before the Agricultural and Manufacturing Association of North Alabama, has been received. We will pay our respects to it in our next issue.

Hampshire Boar.

Above our readers have an engraving of Mr. Peyton Johnson's "Frank," copied from a photograph taken after he was fatted for the butcher.

"Frank" was a beauty before so much fat was deposited upon his carcass as to destroy all resemblance to his former self. We considered him one of the finest looking hogs we ever saw, both as regarded form and color; and we are sorry that it has been necessary to "save his bacon." From an injury he received, his usefulness as a boar was destroyed, and he was not long since killed. We hope Mr. J. will raise a worthy successor to him.

Khaisi Cattle.

Messrs. Kuhn & Martin of this city, own a bull called "Mazeppa," bred by Doctor John R. Woods of Albemarle county, which is a cross of the Khaisi, with the thorough-bred Durham. He is the most perfectly beautiful animal that we have ever seen, of any breed, and the calves sired by him, have all grown very rapidly, and promise to be valuable for either the dairy or the butcher. The impression has generally prevailed we believe, that the Khaisis are entirely unsuited to our wants; and yet, from what we have seen of their crosses upon Durham and native stock, we cannot help believing that they have been too hastily judged, and that the value of our native stock would be greatly enhanced by crossing with them. Two of our neighbors have owned "half Khaisi cows," which were very valuable—one of them giving five gallons of milk a day, and the other rather more than four.

The thorough-breds are rather *too* active and frisky, as they cannot be restrained by any ordinary fence; but cattle with one-fourth Khaisi blood would make first rate oxen, as they would possess more activity and spirit than our native stock.

We advise our country friends, who are fond of seeing fine cattle, to go and take a look at "Mazeppa," when they visit this city. They can obtain directions for finding him by calling at the office of the Virginia State Agricultural Society, or at this office.

We hope Messrs. Kuhn & Martin will exhibit "Mazeppa," in company with a lot of his calves, at the shows of our Agricultural Societies next fall.

Orchards and Orchard Houses.

We return thanks to C. M. Saxton Barker & Co. of New York, for a copy of a most excellent work on the best modes of constructing *Orchard Houses, Dwarfing Fruits, &c., &c.*

This book is admirably adapted to the wants of all those who are engaged in cultivating fruits for market, where it is an important item of profit to have them early.

For the Southern Planter.

Lines for a Lady's Album.

BY JAMES A. AUGUST.

You ask me to indite a rhyme,
  Fit off'ring for this volume fair,
Whose leaves should glow with thoughts sublime,
  And words like jewels rich and rare;
I promis'd in a luckless hour
  Tribute worthy of its pages,—
Oh! that man had always power
  To fulfill what he engages.
'Twas on a soft poetic night,
  Pen in hand—trimm'd fair and taper—
I boldly sat me down to write
  Upon finest gilded paper,
Invoking first the muse's aid
  After old establish'd fashion,
To my dismay, the gentle maid,
  Answer'd in a downright passion!
The sheet lay spread in all its grace,
  Fair as that lily hand of thine—
The pen deserves in verse a place,
  The ink was good, the light divine;
But vain was all this tempting show,
  Vain these pretty preparations,
Poetic thoughts refused to flow,
  Fervent though my invocations.
I trimm'd my light and trimm'd again,
  Until it beamed a lustrous blaze,
But all my trimming was in vain
  To brighten fancy's dying rays.
Then finding all bright visions fade
  Like moonbeams on a misty night,
I call'd the muse a fickle maid—
  I own, 'twas very impolite.
My very inkstand seem'd to leer,
  Mocking at my vain endeavor;
I rose in anger from the chair,
  Turning ink and table over!
Then overcome with dark despair,
  I threw myself, with all my woes,
Into a friendly rocking-chair,
  And soon began to dream and doze:
Then sweet sleep stole gently o'er me,
  All dark mem'rys fled like bubbles,
And such visions rose before me,
  As supplanted all my troubles.
I saw a fair and joyous throng
  Of maidens on a flow'ry lawn,
And as they gently tripp'd along,
  Each looked as lovely as the dawn,
But one there was whom well I knew,
  And Lady! all but you might tell,
On *whom*, each nymph a garland threw—
  On *whom*, each rosy chaplet fell.
Many a lovely child of air
  Was floating in that smiling train;
The graces, hand in hand, were there,
  And beauty with her magic chain.
There music, too, trill'd softest tune,
  How could the gentle sylph refuse;
And Lady—doubt it not—there shone,
  In all her wonted charms—the muse!
"Poor simple youth!" began the maid;
  "Think you that I could tamely bear
That one should call on me for aid,
  In off'ring at a shrine so fair,—
Drink inspiration from yon eyes,
  When fancy's flame is burning low,
And beaming from their kindred skies,
  A far diviner ray will glow!"

Agricultural Hymn.

BY REV. JOHN PIERPONT, D. D.

To God, the gracious Giver,
  Of sunshine, dew and rain,
Of hillside, vale and river,
  And broad and fertile plain,—
Who giveth to our mountains
  The glory of their trees,
And poureth out the fountains
  That fill our inland seas.

Who wrappeth Winter's bosom
  In his soft, woolly snows,
And openeth every blossom
  That Spring around us throws,—
To HIM, our tribute bringing,
  Of thankful hearts, we come,
With joy and gladness singing
  Our hymn of "Harvest Home."

Shall we, Thy sons and daughters,
  Withhold our grateful lays,
While all Thy winds and waters
  Are vocal in Thy praise?
No! while all earth rejoices
  In Thy paternal care,
Will we lift up our voices,
  O, God, in praise and prayer.

* * * * *